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ELECTRIC LIGHT

TELEGRAPH, TELEPHONE &

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In which the defects so long recognized and looked upon as inherent in Porous Cup Batteries are met and overcome.

The following improvements in form alone will at once commend themselves to all who use batteries:

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5. **The Connection for the Carbon** is a patented metallic clamp and thumb screw which can be removed and replaced in a moment and which is perfect in its function as a battery connector.
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NOTICE:—The Battery is Covered by Patents and Infringers will be prosecuted to the Extent of the Law.

The Leclanché Battery Co., Office, 149 West 18th St., New York.

ELECTRICAL REVIEW

ILLUSTRATED.

A WEEKLY JOURNAL OF

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Ferranti Machines for Paris.

It is stated that a considerable stir has been caused among electrical circles in France by reason of the judgment of the commission which was appointed to consider the tenders for the central station at the Halles Centrale, in which the contract for dynamos was awarded to M. Patin, representative of Ferranti. The *Electrical Engineer*, of London, says that the council had resolved that all material should be exclusively obtained of French houses, and although the tender was sent by a French house, the dynamos are of English construction, and the commission are confronted with the question that if one, then all the contractors ought to be allowed the right to employ foreign manufacturers. MM. Mascart and Potier, the only two electricians appointed on the commission, report as follows. M. Mascart says: "If I had to choose for my own installation or for a central station to be erected by me, I should give preference to the Ferranti machines. But as representing the town of Paris, and judging on its account, I consider the advantages of the Ferranti machine over that of Zipernowski not sufficient to necessitate the council going to foreign rather than to French industry." M. Potier, in his report, comparing the three projects—Siemens, Zipernowski, and Ferranti—says the two last have the greater efficiency, owing to the absence of iron in the armature. He prefers the three Ferranti machines to six Siemens machines, as being easier to manage. The tender for Ferranti machines is the higher by about 40,000f., but there is 12 per cent. greater output. With these there will be an additional 7,200 watts for each dynamo of 140 h. p.; or for two machines 14,400 watts at equal expense of fuel, salaries, etc. The price settled upon for supply to customers is 15 centimes per 100 watt hours. Taking only 10 centimes, and 1,000 hours a year supply, each watt will produce an increase of one franc in the receipts. If Ferranti machines are employed, this means an additional income of 14,000f., against which is to be put the interest on the additional 40,000f. It is true the project of M Patin comprises dynamos of 113,000 watts, while the engines will only supply 90,000 at the outside; but the contractor has given written guarantee for an efficiency of 88 per cent. even with engines of only 140 h. p., and additional engine-power can be added. Under these conditions, if the financial guarantee given by M. Patin are sufficient, M. Potier advises the sub-commission to accept his tender for high tension machines and accessories.

Statistics of the Telephone on the Continent.

Mr. Rothen, in an article in the *Journal Telegraphique* of the 25th Nov., the last of a number of most important articles, gives the following statistics:

Belgium—14 stations, with a total of 4,674 subscribers. Largest stations—Brussels, 1,156; Antwerp, 1,086; Liege, 519 subscribers.

Denmark—6 stations, with a total of 1,837 subscribers, of which 1,996 in Kopenhagen.

France—28 stations, of which 2 in Algiers, with a total of 9,487 subscribers. The two largest stations—Paris, 5,330; and Lyons, 732 subscribers.

Italy—28 stations, with a total of 9,183 subscribers. Largest stations—Rome, 1,835; Milan, 1,213; Naples, 992; Florence, 748; Turin, 681 subscribers.

FIG. 1.—See "Electrical Measurements."

Luxemburg—15 stations, with a total of 438 subscribers, of which 298 in the city of Luxemburg.

Norway—21 stations, with a total of 3,930 subscribers. Largest stations—Christiania, 1,670; Bergen, 665 subscribers.

Holland—9 stations with a total of 2,872 subscribers. Largest stations—Amsterdam, 1,337; Rotherdam, 641 subscribers.

Portugal—Only 2 stations; Lisbon, 541; Porto, 349; a total of 890 subscribers.

Russia—36 stations, with a total of 7,585 subscribers. The most important—St. Petersburg, 1,500; Moscow, 880; Odessa and Warsaw, 700 each.

Spain—8 stations, with a total of 2,218 subscribers, 1,242 of whom belonged to the Madrid district.

Sweden—More than 137 stations, with a total of 12,864 subscribers, of which 5,665 in Stockholm, and 775 in Gotenburg.

Switzerland—71 stations, with a total of 7,626 subscribers. The largest—Geneva, 1,533; Zurich, 1,066; Bale, 929; Lausanne, 544. Length of lines, 2,875 km.; length of wires, 10,535 km.—*The Telephone.*

Opening Long Distance Telephone Lines in Europe.

They have opened exchanges in Baden, Voslau, and Wiener-Neustadt, small towns in the neighborhood of Vienna, and have connected them with trunk lines to Vienna. Further exchanges have been opened in Bohemia, in Warnsdorf, etc., and arrangements made to open exchanges in Carlsbad, Aussig, and Teplitz (the Bohemian coal district). But the government gives its attention mostly to trunk line connections. After all, local exchanges flourish better under private management, whereas trunk line connections are far better in the hands of the State. They have already connected Vienna with Brunn on the Van Rysselberghe system and with the towns of Wiener-Neustadt, Vöslau, and Baden by separate wires, silicium bronze 3 mm. diameter. In 1889 they intend connecting Vienna with Prague, and Prague with Reichenberg, and other towns in Bohemia, all by *separate* metallic circuit lines, a very wise decision, thus obviating all trouble from the telegraphic induction. A similar connection to Pesth and Trieste is also in contemplation.

—— The annual meeting of the Greenfield Electric Light and Power Company was held at the rooms of the Franklin County National Bank last week. The following officers were elected: Directors, H. W. Warner, J. H. Sanderson, J. W. Stevens, F. E. Wells, N. S. Cutler; clerk, C. H. Keith; treasurer, F. E. Pierce. The report of the treasurer showed a satisfactory condition of affairs and a constant increase of business. A dividend of 1½ per cent. has been declared, payable February 1st, from the earnings of the past three months. An improvement in the arc light service has been made by adding a few new lights, and changing the location of others. Other improvements are contemplated.

Electrical Measurements.

No less an authority than Sir John Herschel—whose name will ever suggest accurate scientific expression—when asked to define science, said: "Science is measurement." He was speaking from the standpoint of the physicist, and so true were his words, that upon examination we find that the whole literature of the physical sciences is devoted largely to the questions of dimensions, quantities, numbers, and mathematical properties; and that the best efforts of scientific men have been devoted to devising means of accurately measuring and estimating those factors. And the progress in this department of learning has been within the last 50 years infinitely great. In our youth we learned that three barleycorns made one inch. The foot was the length of the king's pedal extremity; the length of Hercules' foot became the Greek cubit, the arm of King Henry I. became a unit of linear measure, and so forth. Compare such notions with the accuracy required at the present time. It is, in fact, only when the value of work already done becomes known that one is prepared to make further progress, as every step in advance demands increased refinement in the means and methods of measurement. As an instance in point, witness the mutual development of the steam engine and the steam engine indicator. Just as the indicator has advanced to a state of perfection, so that its records are universally relied upon, not only to detect faults in present apparatus, and intelligently outline the direction of improvement, so has there been a gradual improvement in the accuracy of commercial electrical measuring instruments, which are to the electrician what the indicator is to the mechanical engineer.

Not only are many steam plants operated for years without the aid of the indicator, but thousands of electrical appliances are never carefully tested, and, as a consequence, it is true that electrial energy is wasted or misapplied, property destroyed, and profits fail to materialize, and it is generally because of the absence of definite knowledge as to the conditions that are actually observed that losses so frequently exceed profits. When measurements of the value of electrical appliances are actually made much doubt is often felt in regard to the results, because of the supposed inaccuracy of the instruments used, and probably the general indifference to accurate work manifested by many electricians may be justly ascribed to the fact that they have no faith in their measuring instruments.

At the present time, America derives most of its commercial electrical measuring instruments from abroad. They have been defined as either of the permanent or electromagnet type. A general suspicion is felt in regard to the former, and unjustly so, because their defects are not innate to the type, but are rather the natural result of poor design and construction. Those who have had much experience with this type of instrument, of which the Deprez and Ayrton & Perry are examples, will recognize the fact that while those instruments were new, they were subject to rapid and serious changes in their constant. The rate of change, however, diminished with age and use up to a

certain period, when they assumed a condition of stability, and were thenceforth, in so far as the controlling force was concerned, reasonably reliable. Uncertainty as to when this condition of stability was attained, necessitated frequent calibration, and was thus a serious obstacle to accurate work. A second defect, which is usually a very serious one, was the heating error introduced when the instruments were kept in circuit even for the short time necessary to make readings, as every one is aware who has ever used the old-fashioned horseshoe-shaped instruments of Ayrton & Perry. Instruments of the electro-magnet type are, on the other hand, more generally in demand, because of the notion that they are not subject to errors arising from a variable controlling force; they are, however, subject to errors arising from the magnetic persistency of the softest iron, even when in small masses. This error is most noticeable when readings are made with a rising, succeeded by a falling current, and often amounts to as much as 25 to 30 per cent. The best forms of this type of instrument are, perhaps, the ingenious spring voltmeters and ammeters of Ayrton & Perry. These are, however, subject to serious heating and frictional errors.

Another, and almost universal defect which is very common, is due to inaccuracies in the reading scale. A great advance was certainly made when direct reading instruments were substituted for those requiring a multiplying constant, which was constant only in name. It is a notable fact, however, that most of the direct reading instruments, judged by the uniformity of their scale divisions, follow the proportional law. We may well doubt this however, and calibration generally reveals the fact that seldom are there more than two or three of the scale marks correct, and one may be pardoned for being suspicious of printed or engraved scales.

The successful attempt upon the part of a reputable American maker, to furnish reliable instruments, free from the greater number of objections above enumerated, may be justly regarded with satisfaction by the whole electrical fraternity. The Weston Electrical Instrument Company, of Newark, N. J., has recently placed upon the market a new form of commercial voltmeters and ammeters, designed by Edward Weston, the well known electrician. The special aim in designing these instruments has been not only to entirely eliminate such variable factors as have been enumerated above, but to add to the instruments certain valuable features mentioned below. To this end, the electrical, magnetic and mechanical features have been so worked out as to insure permanence and reliability, coupled with simplicity, extreme accuracy, a wide range of scale-reading, and portability. Figures 1, 2 and 3 give general and detailed views of the voltmeter. It will be seen that the field of force is produced by a permanent magnet of peculiar form, while the deflecting body, carrying the index, is a light coil of insulated wire, whose motion, resulting from the dual fields established by the magnet and current circulating in the coil, is restrained by two coiled springs. The springs served also to convey the current into and out of the moving coil.

It is generally acknowledged that permanent magnets can be, and in fact are, daily made which, after undergoing a process of artificial ageing, remain thenceforth practically constant in strength when subject to ordinary use. In these instruments special care has been taken not only in the selection of steel and its proper magnetization and artificial aging, but the magnetic resistance of the acting field has been reduced to its lowest practical limit by the insertion of a central core of soft iron within the movable coil. This core is supported upon the magnet frame by a strap of diamagnetic material. The form of the pole pieces is such that the deflecting coil constantly moves in a uniform field, and hence the deflections practically follow the proportional law, and a direct reading scale of nearly equal subdivisions is obtained. The movable coil is wound upon a light frame of copper, which serves the double purpose of a support, and also, since it moves in an intense field of force, as a damper, thus making the instrument exceedingly dead-beat. All of the important parts of the instrument are made to gauge, and the bearings of the deflecting coil are jewelled. Interchangeability of parts, and the elimination of friction, are thus obtained. A difference of potential of about one and one-quarter volts, at the terminals of the movable coil, serves to deflect the index over the entire scale, the length of the scale being about six inches. This degree of sensitiveness permits, therefore, the construction of instruments having a wide range of maximum scale reading by the simple insertion of differentially wound resistance coils in series with the movable coil.

The external and internal form, respectively, of such an instrument, having a scale of double values, with a ratio of 20, may be seen in Figs. 1 and 2. The scale divisions for the upper values, Fig. 1, are single volts, while for the lower values they are one-twentieth of a volt. The single divisions are of such a size that one can easily read to one-tenth of a division, namely, to one-tenth of a volt on the upper values, and one two-hundredth of a volt on the lower. This form and ratio of scale values is useful for battery work, and especially for storage batteries. The lower scale values are used when examining single cells, or sets of two; and the upper scale values when measuring the aggregate potential difference of a series of cells. In the former case, connection is made with the small binding-post, under the rubber cap on the left, and with the larger binding-post on the right. In the latter case, connection is made with the two large binding-posts.

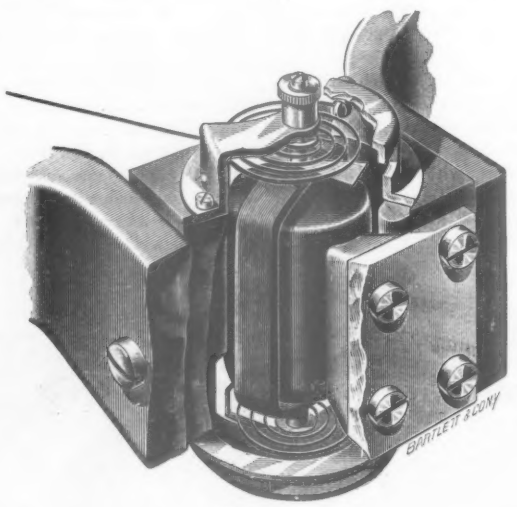

FIG. 3.

Those not in possession of laboratory appliances can verify the scale value by applying a single cell of some constant form, such as is to be found in any telegraph office, to the terminals of the coil giving the lower scale reading, which is a very important fact to those who do not have an electrical laboratory at their disposal. The deflection noted serves as a standard for future comparison with the same or a similar cell, should doubt arise as the effect of accidental usage. All scale readings begin at zero, and extend by practically uniform increments to the maximum reading. The range of scale readings for instruments of a given maximum scale is thus greater than is common, and as the divisions of each scale are the result of individual calibration and checking, the scale readings are uniformly accurate.

The instruments can be kept constantly in circuit, for the temperature correction is negligible, as their resistance is so high (averaging 20,000 ohms) as to prevent any appreciable heating error. The ammeters have the same general appearance as the voltmeters, and possess the same merits of permanency and reliability.

Electricians and electrical engineers will find that these instruments afford the means of obtaining measurements correct to within one-fifth of one per cent., and special instruments are guaranteed correct to within one-tenth of one per cent. If the limits of error were even 10 times as great as claimed, these instruments would still possess a greater accuracy than has been common to commercial voltmeters and ammeters. It is certainly to be hoped that actual practice will substantiate these claims.

Storage Batteries at the Ball.

There were two series of 35 cells each of the N. Y. Electrical Accumulator Company's "15A" cells which were connected in parallel and supplied current for 90 sixteen candle power lamps from 6 o'clock in the evening until 4 o'clock in the morning. These cells were charged at the company's works at Newark and carted to Dr. Webb's residence in New York on the day of the ball, where they were placed in the basement. The lamps were used for the illumination of the ball-room and the banquet hall. In the former there were 60 lights, which were suspended from the cornices and formed a border on four sides of the room. Beneath the lights was stretched a width of very thin transparent pongee silk, which agreeably tempered the light and gave it a pink tinge. The ceiling and walls of this room are very handsomely frescoed, and the light illuminated the paintings so effectively that they displayed beauties that had not before been noticed by the family. In the dining hall there were 30 lights distributed in a somewhat similar manner, the lamps being enclosed in decorative globes, some of cut glass and others opal, arranged uniformly between the carved panels on the wall. The effect in both rooms was magnificent, and no accident or hitch of any kind occurred.

The Electric Motor in Philadelphia.

Owing to the lack of suitable current in the city of Philadelphia, the motor business has been at a standstill, but the Edison Company will soon be in a position to supply current over quite a large portion of the city. Messrs. Chadbourne, Hazelton & Co., representing the Sprague Electric Railway and Motor Company, of New York, have just made the first important installation of an electric motor in the city of Philadelphia. The motor referred to is 15 h. p., wound for 110 volts, and is now supplying power in the office of the Philadelphia *Press*. This machine is the first of a much larger installation which is expected to be placed in the *Press* office; it is belted to a large Hoe press and folder, which has a capacity of over 200 papers a minute, and requires from 90 to 200 amperes to drive it. All the complicated connection with the steam engine in the basement floor were taken out, and great doubt was expressed by those interested in the newspaper, as to whether the motor could move for a large press at a satisfactory rate of speed. The motor was put in place at 9 o'clock Friday night, and at 11.30 started in for nine hours run; it has given the most perfect satisfaction, keeping a constant and steady power running without sparking or heating of any kind, and they turned out 20 more papers a minute than they were able to do with the former power. The current is supplied by a special dynamo at the Keystone Electric Light and Power Company,s station on Sansom street. The *Press* foreman and all interested express entire satisfaction at the perfect working of the machine.

—— The electric light plant at the Alpha Mills, Charlotte, N. C., is completed. One hundred incandescent lights are now in use.

Prof. A. Graham Bell at Cornell.

TO THE EDITOR OF ELECTRICAL REVIEW:

The Electrical Mechanical Engineers of Cornell University had a rare treat Friday, January 18th. Prof. A. G. Bell gave them an interesting lecture on: "The Disturbances on Electric Circuits and the Balancing of Induction." An hour before the time for the lecture every available seat was taken in the physical lecture room, and long before the lecturer's appearance all standing room was taken and the halls and laboratories were crowded. As Dr. Thurston and Prof. Bell entered they were greeted by rounds of applause by the students. As usual Dr. Thurston made a few remarks to the electrical and mechanical engineers and then introduced the speaker, Prof. Bell, who said: "I recall with very great pleasure the welcome that you all gave me on my last visit to this University when I had so much difficulty in entering your door. I am very glad to see such interest taken in this subject. On my last visit I gave you a few words upon the telephone itself, its construction and uses. To-day I wish to give you an account of some of its difficulties and the ways of overcoming them, and the knowledge obtained in overcoming them. Of course we all know when listening at the telephone that there are disturbances on the line. (Laughter.) There are noises of various kinds, bubbling, ticking of Morse instruments, rumbling of dynamos and a mixture of various other noises too numerous to mention, and I propose to direct your attention to these and have you accompany me in some of my investigations of these strange noises and the way of overcoming these difficulties. In the early days of telephony when the instrument was first taken from the laboratory and connected on the first line of wire you cannot imagine the strange bubbling noises which came forth. My father-in-law had an estate in Cambridge and here I made many experiments. On these grounds I experimented with the earth connections. We had a wire about 50 meters in length and a telephone upon each end, from each receiver a wire was held in the hand. By simply standing on the plot of grass words were communicated easily. Then it was tried with bricks upon which we stood and it worked equally well. Finally we took dry boards, which were non-conductors, they also worked well; this puzzled me and making a close observation I saw a small blade of grass had extended over the edge of the board. I tried again and found there was no connection. This shows how slight a thing will make the connection; by touching a leaf, a flower or even this blade of grass, the words were distinctly heard."

Here the Professor related that the ticking of the Cambridge clock, which was on an entirely different circuit a mile away, could be heard on this circuit distinctly, and he explained the causes of its action. He discussed at considerable length the causes of the many noises, and stated that one large class of disturbances was due to the changes of the electrical potential of the earth. He gave the students in electrical engineering a very novel experiment in finding equi-potential lines, and advised a series of experiments in the laboratory. Professor Bell then related an account of a series of experiments he made on the Potomac, signaling from one boat to another a mile apart, with no metallic circuit between them; this he did by trailing wires in the water after each boat charged by batteries and a telephone receiver connected in the circuit. Signals were exchanged with perfect distinctness, and it was stated that communication might be carried on between large steamers several miles apart, if the electric lighting dynamos on board the vessels were used in place of the batteries in the above experiment. During heavy fogs signals could be made, thus avoiding many accidents which now are of frequent occurrence. He explained the induction balance, and exhibited several of those instruments, among them the instruments which were used in trying to locate the bullet on the person of the late General Garfield. He also exhibited the first bullet extracted, which was located by the induction balance. Professor Bell is a very pleasant and entertaining lecturer, and treats his subject in such a way as to be readily understood by a popular audience. F. C. P.

Ithaca, N. Y., Jan. 19.

The Keystone Company (Phila.) Claims the Right to Lay Electric Conduits.

Equity proceedings have been brought against the city of Philadelphia, by the Keystone Light and Power Company, which sought to have the authorities enjoined from interfering in the laying of its electric conduits. The company claims the right to do this work without the consent of City Councils, basing its claim upon the act of April 29, 1874, under which it is chartered. The company made a similar application last summer, but Judge Allison refused to interfere as an ordinance was then pending in Councils confirming the company's alleged rights. This ordinance has since been defeated, and the company fears that it will be molested if it should attempt to tear up the streets.

Engraving by Electricity.

A process of engraving on glass and crystal by electricity has been communicated to the French Academy of Sciences by M. Plante. The plate to be engraved is covered with a concentrated solution of nitrate of potash and put in connection with one of the poles in the battery, and the design is traced out with a fine platinum point connected to the other pole. The results are said to be of marvelous delicacy.

Trains Lighted by Electricity.

The use of the electric light on railroad trains has been inaugurated in the Northwest by the Chicago, Milwaukee and St. Paul road. Two trains of nine cars each were started, one train from Chicago for St. Paul and the other in the opposite direction. Both trains are vestibuled throughout, and steam heated from the engines. All the coaches were brilliantly illuminated by electricity from a dynamo in the baggage car. A novel feature in the sleeping cars is an incandescent burner in every section, permitting the occupant to read while lying in bed. The two trains will be run daily.

Victoria's Private Telegrapher.

John Lester Murphy, the Queen's private telegrapher, has a position that is decidedly a sinecure. He travels about in Her Majesty's retinue and does nothing else but attend to the Queen's telegraphic correspondence, which does not amount to very much.

Murphy said the Queen never talks to him direct when she dictates a telegram, but does it through one of her private secretaries. On the occasion of Emperor Frederick's death Her Majesty and a secretary entered Murphy's room at Windsor. Victoria began to dictate a message to the dead Kaiser's widow, but the secretary failed to understand her. She finally became impatient, and said in German to the operator: "Murphy, I'll dictate this to you. You seem to be the only man of sense in the house." Considering that His Royal Highness, the Prince of Wales, and His Highness Prince Battenberg were at Windsor just then, it doesn't seem strange that Murphy feels himself highly honored.

The Tacomaites Know a Good Thing.

[*From the Tacoma, W. T., Ledger.*]

The ELECTRICAL REVIEW, an illustrated weekly journal of electric light and power, telegraph and telephone, and scientific progress, comes to the *Ledger* from New York City. It is devoted not only to the technicalities of electric science, but to its popular incidents and phases, which makes it valuable to all who have an interest in the progress of the latest and most powerful and docile servant of man. The progress of electrical usefulness is wonderful. Within the last quarter of a century it has passed from the condition of a curious plaything to that of a great practical force in the world's work—perhaps the highest force in nature. So it comes about that to all students and observers an electrical journal is a necessity equal to that of any other scientific record. The ELECTRICAL REVIEW appears to cover a wide range of observation in its chosen field, both as to the progress of the art and of its appliance. Electrical Review Publishing Company, 13 Park Row, New York.

The National Carbon Company has sent out a calendar to all its customers which shows in each date space the time of the rising and setting of the sun and moon for each day during 1889.

A Western Scientist.

Mr. E. Miller, of Kingston, Mo., is a budding scientist whose future none dare predict. In the Kansas City *Journal* he gives the public the free benefit of his erudition as follows:

"The iron rails as they lay on the ties are great conductors of electricity, and so are the wire fences. These are the disturbing elements. This unusual electricity is collected by nature in large and positive bodies, we know not where. When the rain cloud comes up, these bodies of electricity are attracted to them in such ponderous masses that the clouds cannot neutralize them, and sometimes change the course of the clouds, and then we have a cyclone; or sometimes they take the same course of the wind, and then we have a hurricane or straight wind, as they are called. But the disturbing element is all the same.

"Now, if the railroad companies were required to put down ground rods, say six feet long, one inch in diameter, attached to each rail, and down into the earth at least five feet, and 200 or 300 feet apart the whole length of the road, and all farmers who have wire fences required to put down ground wires 200 feet apart, this vast amount of electricity would be neutralized, and peace and safety secured to every man, woman and child in the great State of Missouri, excepting a few miles along the border, and if other states would do the same, the 'funnel-shaped cloud,' or 'tornado,' would be heard of no more."

Tabulation by Electricity.

Surely this is an age of progress. It is not unlikely that the next census will be tabulated by electricity. There is no doubt that if the invention recently perfected by Mr. Herman Hollerith, one of the special agents of the Tenth Census, should prove as practical on a large scale as it has done on a small scale in the office of the surgeon-general, the tabulation of all future censuses the world over will be made by electricity.

The current number of the ELECTRICAL REVIEW contains an illustrated article of great interest and value on the achievements of this remarkable electrical tabulator. The chief cost of the census is the tabulation. In 1880 it cost $2,385,999, and in 1890, if the same methods are employed, the cost may reach $3,000,000. * * * * If electricity is to be called in to aid in taking the next census, it ought to be done promptly.—*N. Y. Press.*

—— It has been said that the introduction of electric lights into a place causes an extra consumption of gas. This has been verified in Belfast. Mr. Pierce, the superintendent of the gas works, says he has conducted the business in Belfast for 23 years, and he is putting out more gas now than in any preceding January in all that time, while the extra consumption in December was 25 per cent.

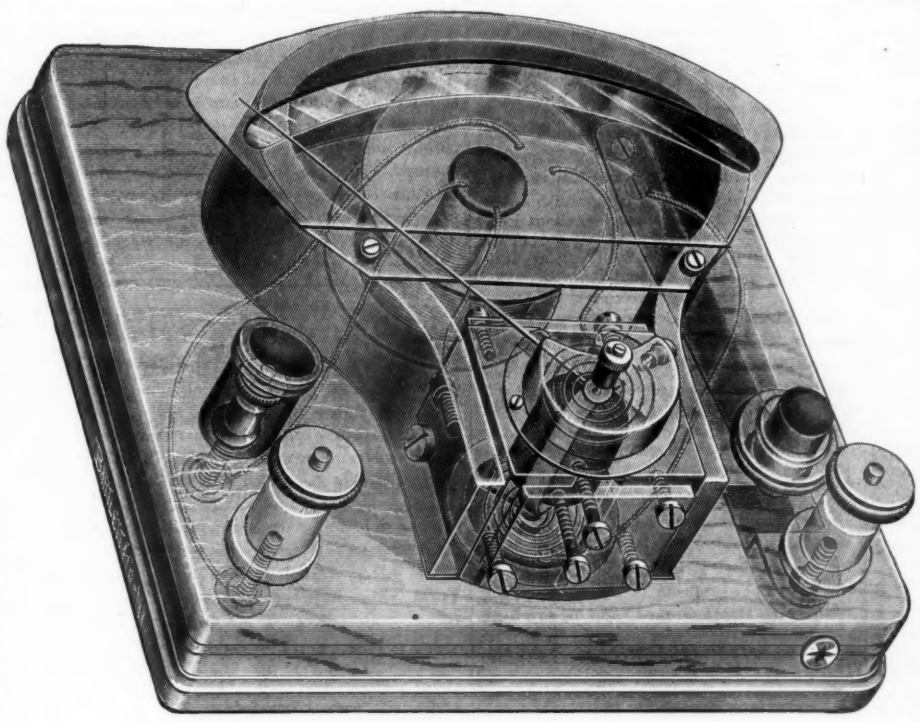

FIG. 2.—SEE "ELECTRICAL MEASUREMENTS," PAGES 1 AND 2.

Another Electric Road Successfully Started.

During the last week, the Asheville, N. C., electric street railway, which has been in course of construction for the last month under the Sprague Electric Railway and Motor Company, of New York, was successfully put in operation.

The test proved a great success. The run was made over the entire distance of the line, about two miles, in less than eight minutes, carrying a large number of passengers.

The citizens of Asheville are enthusiastic over the new electric line, and the directors of the road express themselves as very well pleased with the successful performance of the motor cars.

The Asheville *Citizen*, in speaking of the road, says: "Hurrah for the Asheville street railway. The enterprise is a great one for Asheville, and all honor and credit to its projectors and owners. The Asheville electric street railway is a great success, and we would like to say that there are no *muscae domesticae* on the Asheville electric street railway, or upon those who control it."

It is reported from Concord, N. H., that the Canadian Pacific Railway is experimenting with electric lights, with the end in view of placing the same on the Montreal and Boston trains when perfected. It is proposed to use the incandescent system, with storage batteries in each car.

Philadelphia, Pa.—Main Belting Company of Philadelphia; capital, $100,000.

Camden, N. J.—The Keystone Construction Company, with an authorized capital of $100,000, of which $5,000 is said to be paid in.

Chicago, Ill.—The New York Construction Company; capital stock, $30,000; to construct railroads, telegraphs, &c.; incorporators, S. G. Clark, Norman N. Gifford, and Lawrence P. Boyle.

Albany, N. Y.—The Edison Light and Power company, of Albany, filed with the secretary of state a certificate setting forth the increase in the amount of its capital stock from $30,000 to $60,000.

Chicago, Ill.—The Chicago Engineers' Supply Company at Chicago; capital stock, $10,000; for the manufacture of engineers' supplies; incorporators, John Boylston, Jas. C. Martin, and Orlando Briggs.

Chicago, Ill.—The Union Grease Company, at Chicago; capital stock, $1,000,000; to manufacture and sell oils, grease, and lubricants; incorporators, L. M. Meilly, Eleazer B. Loring, and Robert B. Kendall.

Chicago, Ill.—The North western Contracting Company, at Chicago; capital stock, $25,000; for engineering, architectural and construction work; incorporators, H. P. Reigart, G. T. Spilman, and H. V. Donaldson.

Chicago, Ill.—The Sperry Light and Power Company, at Chicago; capital stock, $100,000; to establish, maintain and operate electric light plants; incorporators, Samuel P. Parmly, Charles E. Gregory, and Elmer A. Sperry.

Chicago, Ill.— District Heating and LightCompany; capital, $600,000; to supply steam, hot air, light, for cooking, heating, lighting, and other purposes; incorporators, Louis J. Pierson, Lewis H. Bisbee, and Thomas H. Martin.

Camden, N. J.—The Natural Gas Development Company; authorized capital of $200,000 said to be fully paid in.

Chicago, Ill.—Gold and Silver Solution Company; capital, $200,000; solutions, oils, and liquids; incorporators, Frank Meech, Edgar D. Sackett, and Harrison B. Meech.

Newport, Ky.—At Newport, Ky., a company has been incorporated to manufacture electrical and mechanical appliances, under the name of G. Y. Woods manufacturing Company; capital stock, $500,000.

Chicago, Ill.—The Revolving Semaphone Company at Chicago; capital stock, $250,000; for the manufacture of railroad signals and other railway appliances; incorporators, Augustus T. Leman, Fred F. Bennett, and William S. Brewster.

Chicago, Ill.—The American Heat, Power & Light Company, at Chicago; capital stock, $100,000; to manufacture appliances and apparatus for heating, power, lighting, and other purposes; incorporators, Jessie Cox, William M. Stanley, and Adolph Pike.

Joplin, Mo.—The South Joplin Lead and Zinc Company of Joplin. The stock of the company is not in the market. The following are the stockholders: T. A. McClelland, B. F. Jones, A. C. Spring, H. B. Pain, P. Jackson, J. T. Harwood, D. C. McConey and G. H. Pain.

Milwaukee, Wis.— The Wisconsin Automatic Fire service, of Milwaukee; capital, $100,000; object, to deal in electric and caloric motors, automatic sprinklers, fire alarm signal apparatus, etc.; incorporators, George E. Treat, George Knowles, Jr., and Frank E. Biglow.

Middleboro, Mass.—The Gas and Electric Company; capital stock, $30,000. N. E. Wilber, president; G. A. Smith, treasurer.

Trenton, N. J.—The New York and New Jersey Light and Fuel Company; capital stock, $200,000; Francis C. Lowthrop, Jr., Gardner H. Caire and John S. Van Dick, incorporators. The objects are to establish works for the purpose of utilizing oil as a fuel and for illuminating gas.

New York.—The West Side Electric Light & Power Co., 502 West 53d street. Elsworth L. Striker, president; Hon. John Quinn, vice-president; Horace B. Russ, treasurer; W. Scott Taber, secretary; W. H. Cole, electrical engineer, superintendent. Organized to supply electric light.

Portland, Or.—The Dalles Portage Company by E. W. Paget, H. D. Chapman and F. H. Saylor. The capital stock is fixed at $500,000; and the object of the corporation is to construct and operate a railroad telegraph line.

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Another and a mighty good one! This man Westinghouse has a big and discriminating stomach.

The recent somewhat sensational newspaper attack on the patent office has caused much comment among attorneys and others interested. It is well understood that great improvement could be made in the business of examining and disposing of applications for patents if the office had room enough and clerical force enough to promptly transact the enormous and rapidly increasing volume of business brought before it, and especially if it could pay salaries sufficient to secure and retain the services of men best qualified for the duties. The department has for many years been, in a large degree, an institution for the education of patent attorneys, and the number of eminent practitioners who have graduated from the electrical division clearly shows that even this important branch of the office cannot retain its examiners after the first few years of service.

The Electric Club, New York, is the best lighted building in the world.

There is a little—we mean big—electric light company up at Cleveland, Ohio, that preserves its equanimity and gilt-edged bank account undisturbed through all the combinations and rumors of combination.

The increase in cable manufacturing facilities in this country will probably relieve the government of the necessity—if it ever existed—of sending abroad for its supply. It should patronize American manufacturers.

For lighting up battle fields at night to tend the wounded, the London Division of the Volunteer Staff Corps have recently made some interesting and successful experiments with electric light feeding from ambulances.

If you want to strike an atmosphere redolent with the sweet perfume of victory just visit the offices of the Edison Electric Light Company, Broad Street, New York city. Sunbeams come through the windows, roses and heliotrope adorn every desk.

The Committee appointed by the National Electric Light Association, to report upon conduits and underground conductors, are already receiving a large number of responses to their circular sent out some two weeks ago. In order that the report shall be complete and thorough, all circulars should be answered before February 8th.

Although written to suit a particular situation and location, the letter of President Mulvane of the Missouri and Kansas Telephone Company, which we publish on another page, contains many excellent ideas that should be read by the advocates of the uncalled for and the unwise legislation directed against telephone rentals.

One of the striking features made prominent by the recent Supreme Court patent expiration decision, is the apparent satisfaction with which it is received by many different electrical interests. However, gentlemen, whether it affects you all for good or for ill the Edison Electric Light Company deserves the credit of making the fight and winning it.

The *Manufacturer and Builder*, of New York, appeared January 1st with a new cover, appropriate and striking. This journal is nicely printed, reflects credit on the publisher, Mr. Henri Gerard, and is carefully and intelligently edited by Dr. Wm. H. Wahl, secretary of the Franklin Institute. The REVIEW is pleased to note the improvement and evident prosperity in this, one of its most valued exchanges.

The enlistment of the United States Electric Lighting Company on the side of the Westinghouse interests is an important and valuable strengthening of the Westinghouse forces. Just what the terms of the agreement consist of are not announced, but that a very close alliance has been made, our readers are informed in another column. The United States Company is one of the oldest electric lighting companies in the country. It is the owner of a splendid electric lighting system which is in use in a very large number of isolated plants and central stations in all parts of the country. While it has been conservatively managed it has done a safe and satisfactory business, and its staff is composed of a number of experts and thoroughly well informed electrical gentlemen.

The recent trials of the dynamite gun by Capt. E L. Zalinski, U. S. A., have quite successfully demonstrated its efficiency. On Saturday of last week nine shots in all were fired, with projectiles seven feet in length, 10 inches in diameter, each charged with 200 pounds of explosive gelatine and dynamite. The uniform range was about 2,100 yards, and each shot struck near the target, the last one fairly striking it. The gun has a smooth bore, divided into four sections, pivoted at the rear on a conical pedestal, upon which it turns by means of hydraulic power. It can be elevated by a hydraulic ram to an angle of 35 degrees. At the left side of the gun, at the rear, is a telescope sight with a seat for the operator. When the projectile is in position the gun can be worked by one man with the aid of a hand-lever.

A VALUABLE DECISION FOR AMERICAN INVENTORS.

Several matters of general interest have been discussed in electrical circles during the past week, but the uppermost topic among owners of electrical patents has been the decision of the United States Supreme Court in the Bate Refrigerating case. We announced the decision in our last issue. Since then, counsels of the large electrical companies, particularly the parent electric light companies, have been busily engaged in thoroughly investigating the situation thus presented. We present a number of interviews on another page. It is human nature to look at all things from the standpoint presenting the most satisfactory personal view. The case is simply this: The Edison Company took up the cause of Bate, the plaintiff, believing it covered the point at issue, succeeded in having it advanced on the Supreme Court calendar, and secured a favorable verdict.

It will be remembered that the lower courts decided against the Edison Company in a similar case, wherein it was arrayed against the United States Electric Lighting Company and others. It was, of course, a decision on a technicality. The Supreme Court has wisely, we think, reversed this decision of the lower court, and these cases will now be tried on the broader ground of merit. The decision settled one point emphatically and that is, that the lifetime of an American patent first taken out in a foreign country does not expire until the extreme limit of time for which an extension of patent may be secured in the foreign country. It is an important decision and how far-reaching it may be, the REVIEW is not prepared to state. It is a most just decision, and one favorable to the work of all American inventors.

HOW ELECTRICITY WILL HELP OUT THE EDITOR OF THE FUTURE.

In the *Forum* for February Jules Verne contributes a satirical description of a great American editor in the year 2889. The editor rules the world; he receives ministers of other governments and settles international quarrels; he is the patron of all the arts and sciences; he maintains all the great novelists; he has not only a telephone line to Paris but a telephote line as well, whereby he can at any time, from his study in New York, see a Parisian with whom he converses.

Advertisements are flashed on the clouds; reporters describe events orally to millions of subscribers; and if a subscriber becomes weary, or is busy, he attaches his phonograph to his telephone, and hears the news at his leisure. If a fire is raging in Chicago, subscribers in New York may not only listen to the description of an eyewitness, but by the telephote may see the fire.

The REVIEW is indebted to Lieut. Cottman, U.S.N., for a number of valuable publications, amongst them being "Aberrations of Audibility of Fog Signals," by Arnold B. Johnson, another being the "Annual Report of the Hydrographer," for the fiscal year ending June 30th, 1888.

A Western electric light man, out of a mass of correspondence of a similar nature, thinks that a recent letter contains one query among a half dozen, that deserves especial mention. It is as follows; "Could same wire (electric light) be used as a telephone conductor? * * * You will see by questions asked I am desirous of getting all the information on the subject you can give me!"

On the Nashville & Chattanooga Railroad the telegraph operators are of rather a serious turn of mind. Every Sunday at 2 P. M. the chief operator at Wartrace, Mr. Bramblet, calls the operators along the line to order, and opens a Sunday school. The chief asks questions, and the quickest to open his key gets circuit, and answers the catechiser. Prayers are sent along the line, and a Bible chapter is read in the same way. The only thing of a religious character which is omitted—save singing, of course—is passing the hat.

EXHIBITION AT THE CHICAGO CONVENTION OF THE NATIONAL ELECTRIC LIGHT ASSOCIATION.

The chairman of the executive committee of the National Electric Light Association reports the following progress with regard to the coming convention:

The board of directors of the Exhibition Company have contracted to spend $1,500 in putting in steam heat in the art rooms and large dining hall that are to be used by the electric light people. Only one-third of this sum is paid for by the Electric Light Association, and the remainder is practically offered as a bonus to secure the exhibit, as the directors are much interested in the electrical features, and are offering every facility to make it a complete success.

As has been stated before, they are desirous of sometime in the early future, say a year hence, of having an electric exhibit that will completely fill the great building, and will include everything in the line of electric manufactures.

The large space at the disposal of the committee is practically spoken for now, and it will be quite difficult to arrange for any more space in the rooms taken.

The Thomson-Houston Electric Railway and a car equipped with storage batteries, will be the features in the line of electric railways. The motor service will be represented by Thomson-Houston, Baxter, C. & C., Brush, Belding and Eddy.

Arc light systems in practical operation will be the Thomson-Houston, Brush, Sperry, Excelsior, and perhaps one or two others.

At least three companies will illustrate in practical operation their incandescent systems.

The tickets of admission are now being printed and will be ready for distribution inside of a week. 100,000 tickets have been ordered, but this number will probably not be sufficient if the demands of the exhibitors for tickets for their friends and correspondents made up to this date is any criterion.

Among the other exhibits to be made is the magnificent one promised by the Non-Magnetic Watch Company, the Phœnix Glass Company, and the appearance of the rooms will be very much beautified by the addition of the resplendent wares of the electrolier manufacturers.

Applications for hotel accommodations are being made daily, and from all indications there will be a very large attendance of ladies.

The 900 feet of track for the electric railway will be done in a week; this work is being done by Mr. C. B. Holmes, of the Chicago City Railway Company, whose interest in the advancement of the science of rapid transit, especially from the electrical standpoint, is well known.

The track will have one curve of 50 feet radius, so that the electric railway men will have an opportunity to show how their respective systems perform on a curve.

A MODEL MOTOR FACTORY.

In spite of the rain on Thursday evening quite a goodly number of electrical gentlemen gathered at the new factory of the "C. & C." Electric Motor Company, 402 and 404 Greenwich street, on the occasion of its formal opening to the public. The building is quite new and fire-proof throughout, being built entirely of stone and iron, even the floors being constructed without any combustible material. The building was brilliantly lighted throughout with incandescent lamps, and what was more worthy of note was the fact that all of the machinery throughout the entire establishment was run by electric motors operated from an Edison dynamo in the basement. The entire absence of line shafting and heavy and rapid running belts gave an absolute and entire freedom from the noise and vibration common to all machine shops where they are used. The factory is equipped throughout with the latest and most approved machinery, and every facility is afforded for the rapid and skillful manufacture of the "C. & C." motor, which has long possessed a deserved popularity.

Among the gentlemen present representing the motor company were Mr. E. N. Dickerson, Chas. W. Gould, G. S. Mumford, and H. L. Lufkin.

NEWS FROM ALL POINTS.

Letters from Boston, Chicago, Washington and the South Filled with Interesting Matter.

OUR BOSTON LETTER.

Removal of the Electric Club.—The Electric Club will leave its present quarters at 66 Boylston street, on the first of the month and thereafter occupy commodious apartments at 7 Park street. The Club will occupy the entire third floor of this building which is a part of the Lowell estate, and will have one or two rooms on the floor above.

"C. & C." Motors.—The New England agents of the "C. & C." motors have installed motors during the past week as follows: One horse power arc for the Home Laundry on Tremont street; one-eighth horse power running dental lathe at 120 Tremont street; one-eighth horse power running ventilating fan for D. P. Gosline, 32 Oliver street; two battery motors for Messrs. Ward and Sloane of the Advance Electrical Company, Congress street.

Temporary Lighting Co.—Messrs. J. T. Moriarty and H. C. Wirth have formed a new company, called the Temporary Lighting Company, and are doing an extensive business in furnishing incandescent lights for residences or other places where extensive electric illumination is desired for a short time for dinners, parties and the like. The company have recently done lighting of this sort, using electric accumulators at the residences of E. Rollins Morse, Fred. L. Ames, John F. Andrew, E. V. R. Thayer and other prominent society people of the Back Bay. The Temporary Lighting Company has offices at 19 Pearl street.

Tour of Inspection.—The West End Street Railway Co., through the president, Mr. H. M. Whitney, issued invitations to prominent business men and press representatives to make a tour of inspection over the electric road to Allston, on Saturday afternoon. Special cars were provided, the party leaving the Providence station at 2 P. M., and every opportunity was given of inspecting the road, both conduit and overhead systems and also the power station at Allston.

Important Removals.—The offices of *Modern Light and Heat* are being removed from 178 Devonshire street to 146 Franklin street, a change made necessary by the remodeling of the Hancock Building, but in the new offices much more convenient quarters will be afforded. The Baxter Electric Motor and Manufacturing Company, Frank Ridlen, N. E. agent, will remove its offices early in the spring to the ground floor of the same building, with entrances numbered 146–152 Franklin street. When this change is made the Baxter Company will have some of the pleasantest and most accessible offices in the city.

Holtzer & Cabot.—As recently announced in these columns, Messrs. Holtzer & Cabot have formed a partnership to carry on a general electrical business at 111 Arch street. A manufacturing department will be carried on in the factory at Brookline, which was established by Mr. Holtzer in 1875, where annunciators, fire and burglar alarms, batteries, watch clocks and electric gas lighters will be manufactured under Mr. Holtzer's patents.

Personals.—The many friends of Mr. J. N. Pratt, of the Jarvis Engineering Co., will sympathize with him in his deep bereavement in the death of his mother, which occurred on Wednesday last.

The Electric Welding Co.—The Thomson Electric Welding Company is now occupying its new works, and business is being carried on already testing their capacity. The new shops are models of construction and arrangement.

Dedham Controversy.—Dedham is just now agitated over a controversy between the Dedham and Hyde Park Gas Company and the Dedham Water Company, as to which shall receive a charter for the right to generate power and furnish lights for that town. The outlook seems to be that the Water Company's chances are the best.

Increase of Capital.—The West End Street Railway Company has been authorized to increase its capital stock by $956,000, making a total of one and one-half million dollars.

Club Chartered.—The Electric Club has received a charter from the Massachusetts Legislature. T. W. S.

Boston, Mass., Jan. 28, 1889.

OUR MARYLAND LETTER.

Robbins' Electric Motor.—A new electric motor is being constructed in Richmond, Va., by Robbins of that city, and will be given a trial about the 1st of February on the tracks of the York Road line.

Incandescent Lights in Baltimore Residences.—The Wenstrom Southern Electric Manufacturing Company, with headquarters in Baltimore, is organizing a local company for supplying private residences with electric lights, and a meeting of the directors was held Tuesday. All efforts toward introducing the incandescent light into buildings have thus far been confined to hotels and other large houses, and private dwellings have been neglected. Many towns in the State, and throughout the South generally, are stated to be ahead of Baltimore in the general use of the electric light, but this fact is due to the great cost of stretching wires here.

The Annapolis Electric Light Company.—The directors of the Annapolis Electric Company met in Baltimore. Vice-President Geo. Wells was in the chair. Mr. J. F. Morrison reported that contracts had been made for the building of the works, for the apparatus of the arc and incandescent systems—the Brush arc system and the Westinghouse incandescent—and for the boilers and engines. Harry E. Mann of Baltimore was elected director, *vice* T. Alexander Seth, deceased, and treasurer, *vice* John Halmer, declined. A call of 20 per cent. was made on the stock.

Baltimore, Md., Jan. 26. F. W. K.

OUR CHICAGO LETTER.

The Bate's Decision.—The decision by the Supreme Court in the Bate's Refrigerator case is quite variously viewed from the standpoints of the several companies. The Edison people are jubilant, while the Westinghouse, United States, Mather and others can't see it in the same light as the first named company by any manner of means.

Telephone Rates in Nebraska.—A bill was introduced the other day in the Nebraska Legislature to regulate telephone charges on the same old and unfortunate basis of $2.50 per month, but with a clause permitting additional charges pro rata for use of the lines during the month.

Taxing Telegraph Wires.—The Dakota solons are wrestling with a bill which provides that telegraph companies doing business within the Territory shall be taxed one dollar per mile for the first wire, seventy-five cents per mile for the second, and fifty cents per mile for each subsequent mile of wire in use. This doubles the rates on these companies.

Election of Officers.—The Chicago Edison Company held its annual stockholders' meeting the other day, and elected Messrs. E. T. Watkins, Robt. T. Lincoln, Jno. B. Drake, R. C. Clowry, E. M. Phelps, J. W. Doane, B. L. Smith, E. L. Brewster, A. A. Sprague, A. F. Seeberger, and F. S. Gorton, directors. At the meeting of directors held subsequently, E. T. Watkins was elected president, and F. S. Gorton, secretary and treasurer.

The U. S. Electric Light Company Wins.—The case of the United States Company against the county for $20,000 balance on the electric light contract made with the commissioners in 1885, was submitted without jury, for trial. Judge Gresham has decided that the county, having received and used its electric plants, must pay for them. The county attorney contended that the contract could not be enforced, because the appropriations for the year had been exhausted before the contract was made. Judgment will go for the full amount.

Illinois Criminals to be Executed by Electricity.—Illinois is following in the wake of New York in the matter of executions by electricity. Jones, of Sangamon, introduced a bill on the 24th which is modelled after the New York law. It provides for execution at the state prison, not less than 25 nor more than 45 days after sentence of death has been pronounced. Witnesses permitted are a justice of the Supreme Court, the State attorney, the sheriff of the county where conviction was had, two physicians, and 12 reputable citizens of lawful age, to be selected by the prison warden. Two ministers, priests or clergymen may at the request of the condemned be admitted, and the warden may appoint seven assistants to attend the execution, but witnessing by the general public or miscellaneous admission by ticket is strictly prohibited.

To Utilize a Great National Power.—The immense water power at Lachine Rapids, seven miles from Montreal, is in a fair way to be utilized for electrical power, for the production of light and the running of machinery in Montreal. The present promoter, M. D. Barr, an electrical engineer, has high and well grounded hopes of success.

$200,000 for City Lighting.—The prospect is fair for an appropriation the coming year, amounting to some $200,000, for the extension of Chicago's electric light system. So one of the city fathers has stated.

Telephone Ball.—The annual telephone employés' ball occurred on the 25th, and the affair, which was a masquerade, was eminently successful; but the girls put the usual amount of vim in their hellos next day, precisely as if nothing had happened.

Personal.—T. Wayland Clark, formerly of the *Western Electrician* here, writes me from Tacoma, W. T., that "electrical matters are somewhat dull up in this part of the country, but nothing else is. As you know, D. H. Louderback is here. He is delighted with the country, and has made some heavy investments which promise large returns. I regard the probabilities of success here as very flattering." Mr. Clark is city editor of the the *Evening News* at Tacoma.

C. C. H.

Chicago, Jan. 26, 1889.

OUR WASHINGTON LETTER.

The Senators Discuss Electricity.—A very entertaining discussion on electrical science was indulged in by the Senate last Wednesday, when an amendment to the District bill regulating street railways was under consideration. It was proposed to compel all the roads to relay their tracks with flat grooved rails, flush with the pavement, with the object of removing the obstructions to carriage travel caused by elevated tracks and rough pavements, when Senator Sherman expressed the opinion that, beside these improvements, horse power should be promptly abolished and either cable or electric motive power be substituted. He believes that electric power is far in advance of any other and declared that the Thomson-Houston line on New York avenue, forming a straight, open way with columns 200 feet apart, lighted at night with brilliant effect, is rather beautiful than otherwise, while the current of 500 volts required to propel the cars is so perfectly safe that it would not kill a cat. Senator Dawes mentioned an instance in which a lady had the metal buttons burned off her dress by coming in contact with a lighting wire in a parlor, and the tendency of the argument, in which many senators took part, seemed to favor the use of this extraordinarily safe "street car electricity" for all purposes until Mr. Harris set things right by a very practical explanation of high and low tension currents, danger limits, etc.

The Government's Loss on Foreign-made Electric Cables.—General Casey, Chief of Engineers, has reported concerning 618 statute miles of armored cable purchased in England in 1874, at a cost of $214,265, and stored at Willet's Point, as follows:

"The single conductor cable was of seven-strand tinned copper of best quality; was insulated with three coats of Gray's patent caoutchouc, tapped with longitudinal cotton tape, double coated with India rubber, over that, spiral tape of same material, and the whole vulcanized together in a compact body. It was then served with tarred jute.

"Each wire of the sheathing was passed through hot compound, and lapped with cotton tape previously saturated with compound. The sheathing or armor consisted of ten No. 13 best galvanized iron wires, passed through hot compound, then covered with tarred Russian hemp, again passed through hot compound, again covered with tarred Russian hemp, and again passed through hot compound.

"The seven conductor cable consisted of seven completed cores, as above, stranded together with tarred jute and tapped with tarred cotton tape. The sheathing consisted of sixteen No. 9 wires, prepared and covered as above.

"The above-described cable is to-day practically useless for the purposes of sea-mines, the insulation having been almost entirely lost, but for certain purposes on land some of it may still be used."

It is considered necessary that the army should have on hand a supply of cable for torpedo service, which would be thoroughly reliable and immediately available in any emergency, and General Casey, who has had long experience in these matters, is devising plans to meet the case. It is suggested that unarmored cables may be stored under water to preserve the insulation, and that, when needed, they could be quickly armored and made ready for use.

Electric Light in the Baltimore Post Office.—Specifications for lighting the new Post Office and Court House building, Baltimore, have just been completed by Supt. J. E. Powell, of the Treasury Department, and bids will be advertised for next week. About fifteen hundred incandescent lamps will be required. Separate proposals will be received for, 1st, wiring; 2d, dynamos and steam machinery; 3d, fixtures; 4th, for supply of electric current; 5th, for the complete plant. The department has funds available for this work. A deposit will be required from persons requesting copies of the plans forwarded to them.

The Electric Motor in Naval Work.—The House Committee on Naval Affairs has under consideration a bill appropriating $150,000, to be expended by the Secretary of the Navy, in investigating and experimenting with the Sprague and any other systems of electrical motors, as applied to the steering, lighting, ventilation, pumping and hoisting of naval vessels, and the handling and management of marine ordnance and ammunition, and generally in testing the efficiency of electrical power as applied to marine architecture.

The United States Patent Office.—The present examiner, Mr. F. T. Brown, took charge of the division when a large number of very difficult cases were pending, and the work was five months in arrears. The number of patents passed by him is in excess of the average of the other divisions, and the work is now only one month behind. The complaint made of delay in passing Elisha Gray's applications for his *fac simile* telegraph, is shown, by records accessible to the public, to be without foundation. These applications were filed May 31st, 1888, rejected June 14th on a reference to patents previously granted to Delany and Cowper, which clearly met them as first presented, and finally passed to issue June 30th. An inventor who grumbles about delays after getting his patent through in one month must be hard to please. G. C. M.

Washington, Jan. 25, 1889.

OUR LETTER FROM THE SOUTH.

The Daft Electric Railway at St. Augustine.—The work of pushing the electrical railway at St. Augustine, will be commenced at once. Two additional members of the Daft Electrical Company have been telegraphed for, and the necessary contracts will be entered into immediately for the purchase of the plant. The company has organized as a stock company, with a capital of $100,000, and the books will be open for the sale of stock in a few days. The officers of the company are Dr. J. K. Rainey, president; John Y. Dismukes, secretary, and Messrs. Rainey, Dismukes, and D. R. Knowlton, directors. After the work is started, it will be completed in 60 days. There will be, in all, about six miles of railway.

Electric Lights at Tuscumbia, Ala.—Mr. J. M. Klinglesmith, the representative of the Thomson-Houston Electric Company, of Boston, has nearly perfected arrangements to supply Tuscumbia, Ala., with electric lights.

Personal.—Mr. T. J. Brown has been appointed superintendent of the Thomson-Houston Electric Light Company, of Augusta, Ga.

The Electric Light.—Mr. W. A. Jeter, president of the Tuskaloosa (Ala.) Water Works addressed a representative audience of citizens there, on the 13th inst., on the subject of electric lights for Tuskaloosa. The city council has taken ten days in which to consider the proposition.

Electrical Matters in Texas.—Texas is booming on the subject of electric lights. At Eagle Pass a company has been incorporated, called the Texas-Mexican Electric Light and Power Company, capital stock, $20,000; at Gainesville the Electric Light and Fuel Company will put in another boiler and engine, and enlarge their plant; at Taylor, H. J. Mundel and others are now figuring on the erection of a plant to be a 40-arc light with incandescent lighting, if patronage is secured; at Galveston the time for receiving bids for lighting the city and city buildings for a term of five years has been extended to March.

Another Electric Lighting Company.—An electric light company has recently been organized in Monroe, La., for lighting city and private residences. E. A. O.

Charleston, S. C., Jan. 22, 1889.

SOUTHERN CALIFORNIA LETTER.

A Well Lighted Hotel.—The Edison plant installed last fall at the hotel Raymond, East Pasadena, by Mr. G. S. Ross, of the New England Wiring and Construction Company, is running very smoothly and giving perfect satisfaction. The winding drive up the hill is lighted by 53 sixteen candle lamps, while at each gate post at the entrance is a cluster of four, the whole presenting a very brilliant appearance. The electric lights are at present installed on only the lower floor of the hotel, which is wired for 350 lights, but it is intended to extend the system to the other floors of the hotel after the present season. The dynamo, a No. 10 Edison of the standard pattern, is driven by a 35-horse Armington & Sims engine, and the whole is under the charge of Mr. A. P. Grant, the engineer of the hotel.

A Depot to be Lighted by Electricity.—Work has been begun on the electric lighting plant for the new Southern Pacific depot at Los Angeles. The plant is to consist of a Waterhouse dynamo with third brush regulation, eight 2,000-candle arc lamps, and 32 series incandescent lamps, ranging from 16 to 100 candle-power, in the offices and rooms. The power will be furnished by a 30 horse-power Westinghouse engine. The foundations for the engine and dynamos are not yet completed, but the wiring is being done by Mr. Decker, assisted by P. L. Ennor. The Westinghouse Electric Company, of San Francisco, W. C. Clark, is installing this plant.

Los Angeles Electrical Construction Company.—Messrs. W. R. Blackman, T. E. Beatty, J. W. Warren and Wm. Best have formed the Los Angeles Electrical Construction Company. They will do a general electrical business in installing and repairing machinery, and will keep supplies of all kinds in stock.

Sale of Electric Light Company's Bonds.—The Pasadena Electric Light and Power Company has disposed of $15,000 worth of seven per cent. bonds to the Thomson-Houston Company, of Chicago. The company is soon to erect a brick building, 40x75 feet, on a lot on California street, and their plant will be enlarged both in engine and dynamo capacity.

The Los Angeles Electric Road.—The Los Angeles electric road, which has been stopped for some time by financial difficulties, has been started again and is now running half hourly trips. The road is on the Daft system and is about seven miles in length, running four cars. It is understood that the syndicate of Chicago capitalists, which has control of the new cable roads, intends also to purchase and run this electri road. E. G. T.

Los Angeles, Cal., Jan. 19, 1889.

Telephonic News

*** A semi-monthly paper called the *Telephone* has made its appearance in London, published by Clowes & Sons, Limited.

*** The Bell Telephone employés gave their first annual ball at the Natatorium, St. Louis, last month. There were about 160 present, and the affair was very successful.

*** Mr. Thomas D. Lockwood, of the American Bell Telephone Company, was a New York visitor last week and was entertained at the hospitable home of Electrician John A. Seeley.

*** Michael Pigott, postmaster of Quincy, Ill., put in a telephone, and asked the Government for $48 to pay for it. The President vetoed the bill on the ground that it was unauthorized.

*** Asheville, N. C., thinks she is big enough to have a telephone exchange. If she will furnish subscribers enough we have no doubt General Manager Carson will supply them with telephones.

*** Cleveland, Ohio, is now going through the telephonic throes of changing from names to numbers in calling for connections. The number system is the proper one, and the subscribers will soon see it.

*** Prof. A. Graham Bell has leased his elegant Washington mansion to Vice-President elect Levi P. Morton. The house, although a magnificent one and admirably located, has never been popular with the Bell family.

*** The Southern New England Company have made application to the State legislature to have their charter amended so that they may have power to put their wires underground without asking the privilege of the various city councils.

*** A bill before the Kansas legislature gives the railroad commissioners supervision over telephone and telegraph lines and sleeping car and express companies. These commissioners will have to earn their salaries, or the Kansas law-maker will know the reason why.

*** Telephrase is announced as the new name for a telephone message. This is not at all bad. "He 'telephrased' me that one of his men had sent him a 'telephrase' from the factory over his private telephone line, used exclusively for 'telephrasing' factory matters," etc, etc. There is abundant use for the word.

*** At a meeting of the directors of the New England Telephone and Telegraph Company held January 23d, a dividend of $1.25 per share was declared, payable on Friday, February 15th, 1889, to stockholders of record at the close of business on Thursday, January 31st, 1889. The transfer book will be closed from February 1st, 1889, to February 14th, 1889, both days included.

*** The committee of the Missouri legislature on telegraph and telephone affairs reported favorably on the bill the syndicate of Chicago capitalists desire passed, to allow them to establish in St. Louis the Dorsett conduit system of placing wires, etc., underground. The Western Union Telegraph Company has opposed the measure, but the indications are that the bill will pass and the Dorsett system soon be on trial in St. Louis.

*** The annual report of the International Bell Telephone Co., limited, has been filed with the Secretary of State at Albany. The business is transacted entirely in Europe. The capital is $1,700,000, of which $337,000 is paid in, $1,005,100 is issued in exchange for patents and other property, and in the treasury is $357,000. The assets are exchanges in Europe and shares in various companies valued at $1,250,000; debts, $238,000.

*** Assemblyman Robert Ray Hamilton has already introduced a bill in the legislature of New York, which, if it becomes a law, will reduce the telephone charges to $6 a month in New York and Brooklyn and to $3 a month in other cities.

*** The officials of the Bell Telephone Company at St. Louis say that if the legislature reduces the telephone charges the company will withdraw from the State. Several weeks ago the telephone company won a victory over the city in the Supreme Court, which decided that the city could not regulate telephone charges. The legislature has taken the matter in hand and the telephone company says it will leave the State if the charges are reduced.

*** At Baltimore, Md., the Chesapeake and Potomac Telephone Company has finished erecting their new building which is located at the northeast corner of St. Paul street and Bank lane. The architect was Geo. A. Frederick of Baltimore. The building is a six story structure of free treatment of the romantique style, fire-proof throughout and furnished with all modern conveniences. The basement, the first story, is occupied as the office. The telephone operating room, which is at the old headquarters in the American building, South and Baltimore streets, will occupy the whole sixth story as soon as arrangements are made with the city for conducting underground wires, which enter into a shaft made for that purpose from Bank lane extending up to the operating room. The other four stories are made into offices numbering 24, of which almost all are at present rented. The fine passenger elevator from Whittier Machine Co. is situated in the centre of the building communicating directly with the main hall on each floor. The operating room is to be lighted with incandescent electric lights. The building was contracted for by the firm of Philip Walsh & Sons. The total cost of the building was $100,000.

*** One of the most effectual blanks in use by the Chicago Telephone Company is form 314, a blank for service tests. Superintendent Wilson keeps an operator on the move, who personally solicits complaints of the service from the subscribers. The blank shows the number calling, number called for and time, the number of seconds before the first operator's answer, ditto the first operator's ring, the second operator's answer and her ring, total seconds of time consumed, and the number of seconds till the line is cleared, after the "ring off," with a column for remarks. Many a subscriber who feels that he loses much time waiting for the answer to his call would be astonished if he only held his watch while waiting. Out of a miscellaneous lot of these blanks it is found that in 73 cases calls were answered in an average of 2.53 seconds, while only in three cases were more than nine seconds consumed in getting an answer from the central office. The result of this method of discipline is excellent from several standpoints. It makes operators happy to know their good work is appreciated, schools the subscriber in ways of patience and methods of pleasantness, and it renders the collector's task much easier, while everybody is deprived of the right of, and the reasons for, grumbling.

Looking into the Telephone Business at Kansas City.

A committee from the Commercial Club, Kansas City, consisting of A. R. Meyer, T. S. Case, Adam Long, J. G. Stowe and S. J. Hingston, met recently to investigate the charges preferred against the Missouri and Kansas Telephone Company of charging exorbitant rates. They met at the offices of the telephone company, where they were met by the officials of the company and given every opportunity for pursuing the work in hand. Books, vouchers, etc., were placed at the disposal of the committee and considerable progress was made. The session was prolonged two hours, during which time the receipts and expenditures for December were gone over, even to the most minute detail. The committee made a request for further facts and figures pertaining to the company's business, which the officials promised to furnish at the earliest possible moment, as they claimed that they had nothing whatever to conceal.

Gilbert's Patent Shackle Ball Insulator.

At present, when improved insulation is required at terminal poles, the usual custom is to terminate the wires on insulators of the ordinary pattern. This system, whilst electrically right, is sometimes mechanically imperfect, as there is great danger of the arm splitting and breaking; and, moreover, the insulator gets pulled over from its vertical position and looks unsightly.

It may be mentioned that since the introduction of these balls on the Highland Railway in England 2½ years ago, the improvement in the insulation and the working of the wires is most satisfactory, and therefore

Fig. 2.

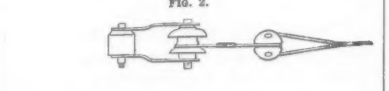


Fig. 1.

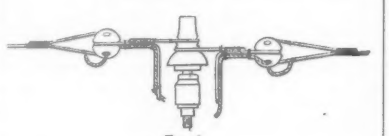


Fig. 3.

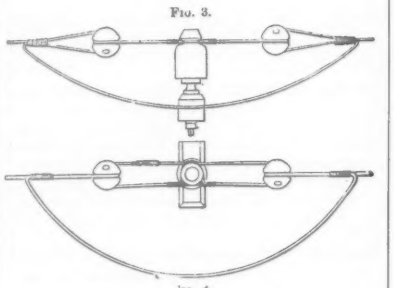


Fig. 4.

it is the intention to employ them to a much larger extent, so that in a little time the old and leaky double shackles will not exist.

Figs. 2, 3 and 4 show different ways in which the shackle balls may be introduced with advantage.

By adopting the arrangement shown by Fig. 1, Mr. Gilbert claims that, for an intermediate station, the cost would be much less than the ordinary Bright's shackle, whilst the superiority of the insulation would be most marked, there being three distinct breaks for the current in place of two.—*London Electrical Review.*

Telephone and Light Companies Quarrel.

The Pennsylvania Telephone Company has filed a bill in equity against the Edison Electric Illuminating Company, of Lancaster, and P. B. Shaw, the lessee, asking for an injunction against the defendants. Plaintiff alleges that the defendant company has removed poles belonging to the former, has strung its wires on plaintiff's poles, the strong current doing them much damage, and in other respects has caused plaintiff much loss. The court granted the preliminary injunction.

The Telephone War at Anderson, Indiana.

The city Marshal began last week to remove the telephone poles and wires from the streets and alleys in compliance with the order of Council, the Telephone Company having failed to remove them as ordered, when he was stopped by an injunction obtained by the Edge Tool Works and others. Some time after the telephone rate-law took effect the exchange was closed, the company saying it could not operate and pay expenses, and the City Council ordered all poles and wires removed from the streets. The telephone company then removed all lines except those connecting with other towns, which the manufacturers and others asked them to let remain and petitioned the Council not to disturb. The petition was not granted, and the removal by the Marshal began with the result noted. Anderson is still in telephonic communication with all points reached by other cities in the gas region and will allow no detraction from its advantages.

President Mulvane, of the Missouri and Kansas Telephone Company, Has a Word to Say.

The following letter is by Mr. John R. Mulvane, of Topeka, Kas., president of the Missouri & Kansas Telephone Co., a company that is just now receiving the attacks of many uninformed and unwise citizens of Kansas City:

To the Honorable Mayor and Council of the City of Kansas, State of Missouri:

President's Office, Topeka, Kas., January 10th.—Gentlemen: We notice in the *Daily News* your action in the matter of telephone rates; on the complaint of some physicians who do not give the facts or offer proofs for the action they ask you to take. You are asked to assume that our telephone rates are exorbitant and to demand rates that mean bankruptcy and ruin to our company, a large interest in your growing city; or a worse probable phase for the business interests of the city by the curtailment or distruction of the telephone business and final abandoment of the city. Kansas City enjoys to-day the best and quickest telephone service in the United States at much the lowest prices of any equally sized city in the United States. In addition thereto, it is an established fact that the use of the telephone per subscriber is fully 25 per cent. in excess of cities of 50 per cent. greater population, and all of this is at an increased cost of operating expense to the country.

Your bank clearings are much greater proportionately to your population than any city in the United States. This same activity is shown in the use of your telephones; while the rates charged in Kansas City are much lower, as the following comparison will show, within the usual three-quarter a mile radius from the central office:

New York city, express and legal	$210	
New York city, business	150	$180
New York city, residence	75	100
Philadelphia business	120	
Philadelphia, residence	100	
Boston, bank and express	120	
Pitsburgh, business	84	100
Boston, business	96	120
Cincinnati, business	72	100
Louisville, Ky., business	72	96
Chicago, business	100	125
St. Louis, business	100	
New Orleans, business	96	
Denver, Col., business	80	
San Francisco, toll for conversations	60	
Kansas City	72	

This charge we increase at the rate of $6 for each quarter of a mile additional distance from the central office. No advance in price has ever been thought of, but we live in hope of the expiration of the patents, when the royalties now paid, will be off and give relief to both the telephone company and our patrons. Our rates are the same on all business telephones that they were when the exchange had only 500 subscribers, while to-day we serve 2,500 subscribers.

This greatly increased facility has been at an increased cost of plant and an increased cost of maintenance. This service is very delicate, and demands trained experts with fair pay as repairers. Trained operators only can give you acceptable service. While we as a company are poor and are burdened with royalties, which must be paid, or we must quit the use of other people's property, yet we in our poverty have tried to serve all applicants, the far away ones, on long lines at a loss.

The rapid growth of the city has made our work expensive, and we have had to pay our part of the high rents and high wages, and stand the constant removal of lines, caused by the grading of your streets; in fact, all the usual increased costs of city service over villages, and the added cost of giving communication to 2,500 subscribers, when the fact is well known that the cost to the company for operating is thereby largely increased by each subscriber added, and the cost of those already in service made much greater by reason of said additions, and the facilities afforded each subscriber for increased use of his telephone.

Charges in great cities must be proportionately greater from the fact that city life and business crowds its activities into the small hours from 9 A. M. to 5 P. M. In a small village with an exchange of 100 subscribers, 500 people are estimated as the number reached by the telephone. How many more have we in a very busy city like Kansas City, with its wonderful activities and population of 200,000 (Kansas City and environs), with the greatest business activity as per population in the United States, and your telephone reaches every corner.

Is 25,000 too great a number, who use the telephone? Can any sane man say that the use of his telephone is not increased proportionately, and its cost for repairing with its increased use and increased cost of operating follows to the company?

We have telephones in Kansas City that answer by an automatic count an average of 75 calls per day for each business day.

Our records show the average use per instrument to be 25 per cent. more than in any other city of like size in the United States.

That we have not grown rich off of you an examination of our financial condition will show.

The Missouri and Kansas Telephone Company has absorbed and is the reorganized Missouri and Kansas Telephone Company of Missouri, the United Telephone Company and the Missouri and Kansas Telephone Company of Kansas.

The Missouri and Kansas Telephone Company was organized in August, 1882, with a capital of	$1,000,000
The United Telephone Company was organized in April, 1883, with a capital of	700,000
Total	$1,700,000
Of which the United Telephone Company held in the treasury unissued	250,000
Total capital stock paid for and issued by the two companies	$1,450,000

The Missouri and Kansas Telephone Company of Kansas is leased at a nominal rental and for the payment of debts to the amount of $250,000.

New stock issued in reorganization at par	$250,000
Joint capital stock	1,450,000
Total	$1,700,000
Reorganized company's stock	$1,250,000
Net loss to stockholders of	$450,000

A stock dividend of $79,585 was paid to the stockholders, at par, in lieu of cash earnings used to pay debts.

The average per cent. of cash dividends is is not quite two per cent. per annum. Average per cent. of all dividends 2¼ (not quite).

The highest dividend paid was in 1887 and was at six per cent. The lowest dividend paid was for the years 1884, 1885 and one-half of 1886, when no dividend was declared.

The rate we hope to pay is six per cent. annually.

The rate paid in 1888 was 1½ per cent. quarterly; three quarters have been paid, making the rate 4½ per cent. The dividend for the fourth quarter of 1880 will probably be paid by the sleet storm of December 25th and 26th.

The market price of Missouri and Kansas stock is now 70 to 75.

For a fully paid stock, without a semblance of water, this price does not presume that large profits are in the business, and this rate of dividends does not indicate an oppressive price to our subscribers; nor that our monopoly has been used to the damage of any citizen. We have paid our debts but not grown rich. Our plant is in the meantime worn out.

We know of none who have done so poorly, and we can only pride ourselves with the satisfaction of giving the most service ever given, per subscriber, at the cheapest rate per subscriber.

We estimate that we have averaged 25 per cent. more connections in answer to calls than any city in the United States. In a humble way we have helped you to build this great rich city, and we feel that we are entitled to a share in its prosperity.

Our share has been to give our stockholders dividends of not quite 2 per cent. on their investment.

We have earned and paid for 1888 three dividends of 1⅛ per cent. each, making a total of 4½ for the three quarters of 1888. Our fourth we got Christmas night in a disastrous loss, that will cost us $18,000 to $20,000 to repair. That storm has developed weaknesses in our plant that will demand before another winter perhaps $50,000 more expenditure. We have kept an army of men and women in our employment at good wages. Our capital has been invested in your city, and we are in your hands. We ask only even-handed justice. Your policy has been to invite capital, and invested capital has built up your immense city. If we are ruined and bankrupted, the question to capital is, who next? What other business interest that has come to your city with the hope of future harvest that has not done better? Our stockholders are all over the country that has so lavishly poured her wealth into Kansas City.

You have the fatal example of Indianapolis before you, not one telephone in use where there were three in said city, and the service an excuse.

You cannot afford to wipe out or cripple this efficient aid to your business men.

We do not believe your business men want their telephone service lessened in the least, but that to the busy business man the better the service the more useful to him; and your city cannot well do without an efficient, prompt telephone service.

We invite the fullest investigation and ask your honorable body to appoint a committee to investigate the facts; for that purpose our business affairs and books are at your service.

On due notice we will gladly meet your committee, or any other body of citizens, and give them the fullest information.

Respectfully submitted,
J. R. MULVANE, President.

Telegraphic Improvements.—The Mackay-Bennett Postal Telegraph Cable Co. is getting ready for business South. It has placed poles between Atlanta and Decatur, Ala., and is distributing them below that point. The Western Union Telegraph Company have recently put up a copper wire from New York to St. Augustine.

Electric Tree Felling Machine.

Hitherto the only mechanical appliance to supersede hand labor in the felling of trees has been the steam tree feller, but the employment of steam for such a purpose is coupled with considerable difficulties. Not only is it necessary to place the boiler in close proximity to the tree to be felled, but the weight of the machine itself is considerable, and its application when the ground is uneven is somewhat troublesome. In a dense forest machinery of this description can only be used when the tree to be felled is either on the borders of the forest or is in a clearance accessible by a road over which the boiler can be transported. These difficulties are greatly minimized, if not entirely overcome, by the application of electricity. The source of power in this case is not a boiler, which must be placed near to the tree, but some prime mover and dynamo machine, which may be erected at any resonable distance from the scene of operations; all that is required to convey the power being a pair of insulated cables, which can be easily brought into the innermost parts of the forest. The felling machine itself is lighter and smaller than a corresponding steam saw, and can therefore be taken over difficult ground and through narrow places where the former could not pass. We illustrate herewith plan and elevation of an electric tree felling machine which has been brought out by Messrs Ganz & Co., of Budapest, especially for use in the Galician forests. The separation of the tree from the stump is in this case not affected by a saw, as is usual, but by a special drill. According to the nature of the wood, this drill may be used either to perforate the base of the tree with a series of holes, placed so close together that when the operation is completed all the fibres nave been cut through, or it may be used to take a sweeping cut, in which case the tool is shaped somewhat in the fashion of a twist drill, but with prominent cutting edges along its side. The latter method is adopted for medium hard and for soft woods, and is illustrated in our diagram. The electro-motor E, with its platform P, is placed on a light two-wheel carriage, which is taken close up to the tree, and shackled to it by clamps and chains, the latter being attached to the axles of the carriage in such a way as to be readily detachable, so that the carriage may be quickly withdrawn if there should be danger of the tree falling before the operation is completed. The platform of the motor is mounted upon a vertical spindle D, in such a way that it can swivel in a horizontal plane. The drill B is carried in a spindle, which receives motion from the motor by means of belt gear, the spindle being provided with a long key bed, and the pulley with a fast feather, so that the spindle may be shifted forwards or backwards by means of the rack R. The mode of operation is as follows: After the machine has been brought up to the tree and shackled to it, the current is switched on, and a sweeping cut of suitable depth is taken across the surface of the tree by slowly rotating the motor on its vertical spindle. The drill is then advanced by a few inches, and a second cut is taken in the same manner, until about half the thickness of the tree has been separated from the stump. When this point is reached clamps are driven in to keep the cut from closing up by the weight of the tree, and the operation is continued until a point is reached when it would not be safe to cut away more of the wood. The shackling chains are then loosened and the carriage withdrawn to a safe distance, after which the final separation of the tree from the stump is performed by a hand saw or by the axe.—*Industries.*

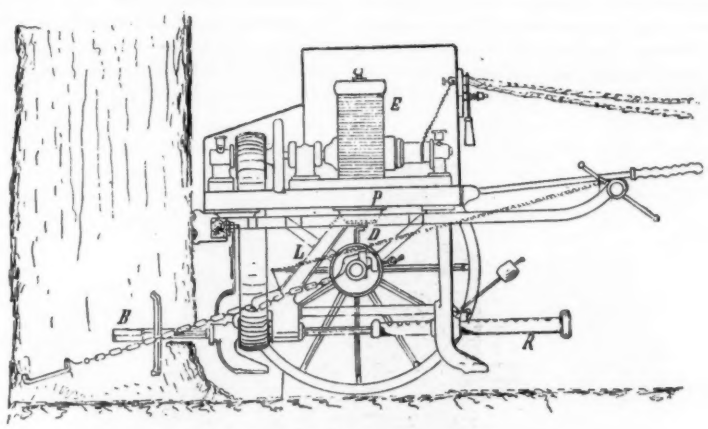


FIG. 1.—ELECTRIC TREE FELLING MACHINE.

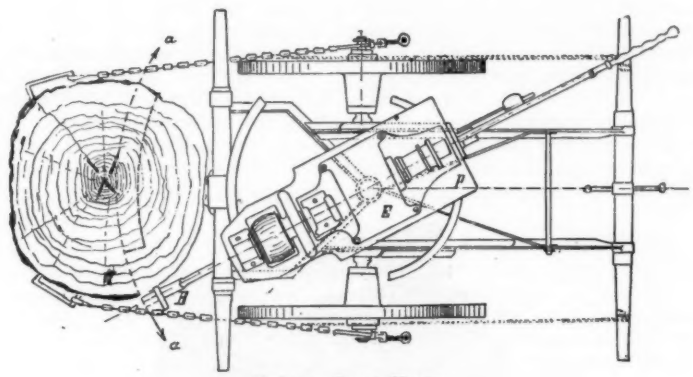


FIG. 2.—PLAN VIEW.

Problem for the Wire Men.

The following interesting letter has been received at this office. It involves one of those questions on which much could be said. Perhaps some of our wire friends will express an opinion.

TO THE EDITOR OF ELECTRICAL REVIEW:

The following is submitted as an electric light problem—perhaps a novelty:

One of the circuits of this company crosses the Niagara River twice: once on the Railway Suspension Bridge, once by a clear span of 1,250 feet. This span was made of an ordinary line wire .165 diameter, deflecting at centre 25 feet. In a few weeks the centre sagged to 100 feet deflection, which was again drawn up to about 30 feet. In the storm of 9th and 10th inst., the line was carried away in the night, but whether it was taken by a part of the neighboring bridge which went down is not known. It has been replaced, but should have stronger wire. Query? Is hard drawn copper wire the proper material? And what size should be used?

Very truly yours,
BENJAMIN RHODES, Mgr.,
Niagara Falls Electric Light Co.

TELEGRAPHIC

.... The Western Union Company is building a line along the Seattle, Lake Shore and Eastern Railroad, from Spokane Falls west, and another along the Oregon Railway and Navigation Company's line from Willows to Hepner. Rapid work is being done on both, and they will be soon completed and ready for business.

.... The following named officers were elected by the Standard Time Company, Waterbury, Conn.: J. W. Hill, president; Charles S. Chapman, secretary and treasurer; C. D. W. Warner, general manager; George M. Chapman, assistant manager. This company is introducing, very successfully, the Warner time system.

.... W. J. Lloyd, chief operator of the Western Union Telegraph Company of Chicago, has been promoted to the position of assistant superintendent of the first district. He will be succeeded by W. R. Holligan, now manager of the board of trade office. David S. Anderson, now assistant chief operator, becomes manager of the board of trade.

.... The Pacific Mutual Telegraph Company, of Kansas City, Mo., has elected the following directors for the coming year: E. L. Martin, Kansas City; L. D. Parker, Chicago; E. S. Stokes, Dwight Townsend, any C. H. Reed, New York City; George M. Myers, Kansas City. The company announces the completion of arrangements for a line to Denver.

.... The use of the telegraph instrument has become so much of an every-day thing and such a convenience, that men seem to forget what a wonderful thing it is, says the N. Y. *Tribune*. A newspaper man telephoned to the cable office the other day and asked if a London special dispatch had come in there yet. The operator replied that it had not, and said: "Wait a minute and I'll ask London if the copy has come there." In a few minutes, not more than 10 or 15, he called over the telephone: "London hasn't received the copy yet."

.... Papers have been served at Montreal in an action on behalf of Erastus Wiman's telegraph company, the Great Northwestern, against the Montreal Telegraph Company, asking the superior court to fix a reduction of rental paid to the latter. The basis of the action is the failure of the Montreal company to maintain the Northwestern company in peaceable and exclusive possession of lines, routes and rights of way on independent railways included within the original lease, but subsequently incoporated by the Canadian Pacific in their system, and more recently usurped for public telegraphic purposes. A peculiar clause in the Quebec code relating to landlords, is relied upon to force a reduction in proportion to the damage suffered, which, if applicable to the future, is also retroactive in its effect.

.... The annual stockholders' meetings of the Western Telegraph Company of Baltimore City and of the Western Union Telegraph Company of Baltimore City were held last week. The meetings were held separately with Mr. James Merrihew, of New York, presiding, and Mr. John J. G. Riley, secretary. The following officers and directors were elected for the year: Western Telegraph Company—Richard J. Bloxham, president; James Merrihew, of New York, vice-president; J. J. G. Riley, secretary; R. H. Rochester, treasurer; J. B. Every, auditor, W. B. Gill, superintendent. Directors—Dr. Norvin Green and James Merrihew, of New York; Charles J. M. Gwinn, R. J. Bloxham and Charles G. Kerr, of Baltimore. The same officers and directors of the Western Union Telegraph Company of Baltimore City were elected, except that Mr. Charles A. Tinker is a director instead of Mr. Norvin Green.

* * Capt. Bradford, U. S. N., has added a motor to the electric outfit of the "Yorktown," and also of the "Charleston," which is used to operate a fan for ventilating the dynamo room.

* * The East Atlanta and Improvement Company, of Atlanta, Ga., have contracted for machinery to run their cars on Edgewood avenue, by electric power. They are to be in operation by March 15th.

* * The Third Ward Street Ry. Company, Syracuse, N. Y., which is operating the Thomson-Houston system, has been somewhat delayed by difficulties connected with the track construction, but is now in operation. It has eight cars and four miles of track.

* * The electric railway of Easton, Pa., has been leased for 999 years to the Pennsylvania Motor Company, J. Marshall Young, president, and D. W. Nevin, secretary and treasurer. It is expected that the Easton and South Easton Company will adopt electricity in place of horse power.

* * The Quincy Mass., Electric Light Company have contracted for increased machinery for their plant. It consists of one Armington & Sims' engine of 150 horse-power, a Cunningham steel boiler of 125 horse-power, a Port & Sawyer complete compostion boiler, 125 horse-power and a 500 alternating incandescent dynamo.

* * An electric road is proposed between Naugatuck and Waterbury. There is a large population along the line between the two places, Union City, Platt's Mills, Hopeville and Simonsville, and people residing between these points regard the project with special favor, while great advantage will be realized by Naugatuck by the transportation of passengers and freight.

* * Lighting trains by accumulators charged by a dynamo and worked by belting off the wheel-axle, though not a new idea, may prove a good one, and the London-Brighton division of the South Coast Railroad are to be congratulated for their enterprise in such experiments. If successful 'twill save much handling of accumulators, says the London *Electrical Engineer*.

* * The Riverside and Suburban Ry. Company, Wichita, Kan., has operated successfully since starting, and has stood all the tests of bad weather, muddy and frozen streets, never having lost a trip. The people of Wichita are enthusiastic over it, and are learning by experience the comfort and satisfaction which this service affords. The track is built of Johnston rails in the city limits, and the ordinary "T" rail is used outside. There are three cars in operation, each equipped with Thomson-Houston motors and lighted with electric lamps.

* * Henry A. Pevear, Hon. Joseph Davis, Joseph N. Smith, George J. Carr, H S. Johnson, W. A. Boland, D. J. Lord, L. S. Johnson, B. F. Spinney, George W. Williams, F. H. Johnson, Gen. Benjamin F. Peach, Jr., Francis W. Breed, C. A. Coffin, S. H. Hudson, Capt. John G. B. Adams, John Macnair, M. C. Clough, J. S. Bartlett, Edward J. Johnson, Arthur W. Tufts, Charles H. Newhall, and W. E. Symonds, mostly all Lynn gentlemen, are interested as stockholders, in the subscribed amount of $50,000, for an electrical railway between Lynn and Nahant, to be constructed at the side of the beach roadway. The gentlemen are to endeavor to get permission to operate the road at the coming town meeting in Nahant in March.

A New Electric Motor.

It is difficult to build small electric motors of high efficiency, automatic regulation and good mechanical design, but in the Perret motor, which we illustrate, the task seems to have been accomplished in a manner very creditable to the designer, Mr. Frank A. Perret, the electrician of the Elektron Manufacturing Company, of Brooklyn, N. Y., the manufacturers.

FIG. 2.—ARMATURE OF PERRET MOTOR.

The first Perret motors were constructed in 1886, and though somewhat crude as compared with those now manufactured, their efficiency and general merit was such that they found a ready sale, chiefly among electrical people. Since then much thought and experiment has been devoted to improvement. The performance of the machines has for some time left little to be desired, but the cost of their manufacture has been excessive and it is only recently that the introduction of new methods, by which the cost is somewhat reduced, has justified their manufacture on a large scale for the market.

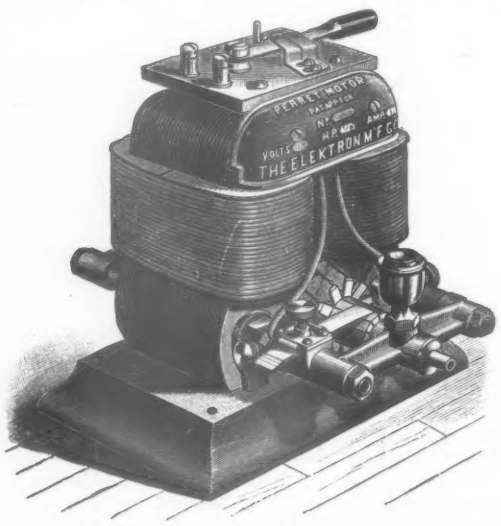


FIG. 3.—ONE-EIGHTH HORSE POWER PERRET MOTOR.

The manufacturers claim for them higher efficiency, better regulation and more perfect construction than in any other motor of equal size, and they invite the closest examination and most careful tests by experts, and offer them strictly on their merits.

They are designed for constant potential circuits or to be run by batteries. Six sizes are now ready, ranging from one-eighth to one and one-half horse-power. The manufacturers will carry these sizes in stock wound for 110 volts, and can furnish them at short notice wound for any desired voltage under 110. The smallest size gives, it is stated by the manufacturers, over 70 per cent. net commercial efficiency, and the percentage increases as machines increase in size, reaching over 90 per cent. in the one and one-half horse-power size.

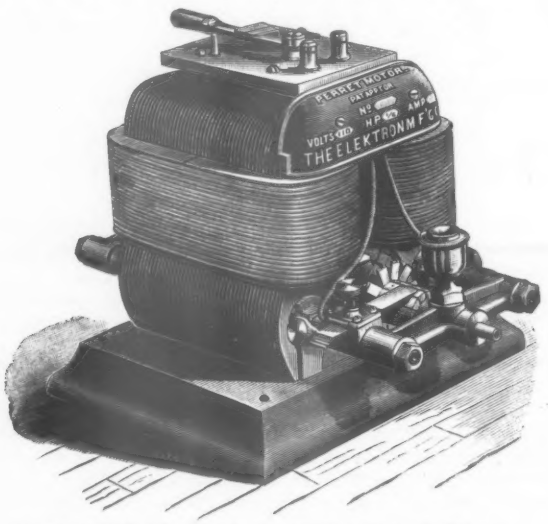


FIG. 4.—ONE-SIXTH HORSE POWER PERRET MOTOR.

This is due largely to the lamination of the field magnets, they being built up of thin plates stamped out of soft refined sheet iron of the highest magnetic permeability secured in planes at right angles to the armature shaft, see Fig. 1. All wasteful induced currents are thus prevented, and a magnetic circuit of the best character is secured. The armature core is also laminated and carefully insulated, and where, as in the smaller sizes, saving of space is very important, double silk covered wire is used, which gives the best insulation in the smallest space.

The constant speed motors have the simple shunt winding which with armatures of very low internal resistance gives close automatic regulation together with high efficiency. The internal resistance of armature of one-eighth h. p. motor is only 11 ohms which is remarkably low for so small a machine. The shunt resistance is over 400 ohms.

A glance at the cuts will show how simple they are, all parts requiring attention being in plain sight and very accessible. The armature may be removed and replaced in running order in less than one minute.

The bearings are all accurately fitted and are very long in proportion to their diameter. In the two smallest sizes they are of hard composition and in the larger of Babbit metal. The shafts are of steel ground on dead centres. The armatures are of the "drum" type, see Fig. 2, and are models of fine workmanship. They have received many compliments for beauty of winding and perfection of balance.

The wires on armature are as short and thick as possible and the insulation is very throughly done.

The commutators which are usually liable to wear and to damage through sparking have received particular attention. They are of hard bronze, carefully insulated and sparking is prevented by so proportioning the field magnet and armature that there is no distortion of the field, consequently the brushes do not require changing with changes of load.

All wearing parts are made interchangeable. The armature is so supported that perfect alignment with the field magnet is always secured regardless of variations in the iron plates. The machines are solid and compact in construction and extremely elegant in appearance, the best of workmanship being used throughout

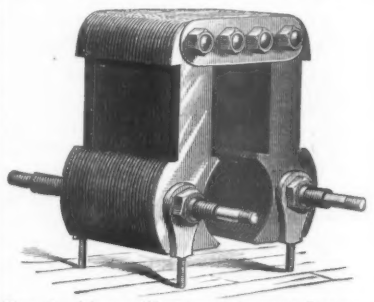


FIG. 1.—FIELD MAGNET SHOWING LAMINATIONS OF PERRET MOTOR.

The Elektron Company is strongly organized with excellent facilities and abundant capital. Mr. W. D. Sargent, the widely-known general manager of the New York and New Jersey Telephone Company, is the president, and Mr. John A. Barrett, vice-president. Mr. E. F. Cutler is the manager and treasurer, and Mr. Frank A. Perret, electrician.

Manufacturing Notes.

The western office of the Bentley-Knight Electric Railway has been established in the Pullman Building, Chicago, with Mr. J. Gorham as manager. A full line of their equipment is on exhibition,

The New York Insulated Wire Company are about to move from Reading to Middletown, Conn. The citizens of the latter town have made very good inducements for them to move. This company manufacture the Grimshaw wire.

The National American Non-Magnetic Watch and Case Company, with a capital stock of $500,000, recently formed in New York, have made overtures to locate their works at Mason City, Iowa. The citizens are very anxious to have the company come, and it is probable that a large factory, employing a great many hands, will be built at an early day.

The Phœnix Glass Company, of New York and Pittsburgh, has issued "Catalogue No. 3," which comprises a series of plates illustrating the many elegant designs in arc and incandescent electric light globes, shades, etc., manufactured by this most progressive company. This catalogue will be specially sought after by electric light companies as giving the latest and most artistic features in glass for this use.

—— The Northampton, Mass., electric light plant was started in 1886 with a capital of $40,000; 55 street lights and nine commercial arc lights and no incandescents. In 1887 a dynamo to furnish 150 incandescent lights was put in and the increase has been going on ever since. The plans outlined last spring are nearly consummated until the plant is now well housed in new brick buildings and comprises three boilers of an aggregate capacity of 350 horse-power and three engines of 305 horse-power capacity. The company now have in actual service 90 street lights, 22 arc lights in buildings, 30 series incandescents with over 400 direct incandescents. An alternating dynamo of 500 lights and another of 800 lights direct have been put in more than doubling the capacity. The works will be run all night hereafter, to accommodate the largely increasing patronage. This company has increased its capital to $65,000. All these changes have involved an immense amount of labor, which has all been done under the personal direction of W. H. Coleman, the efficient superintendent of the plant.

The Association of Edison Illuminating Companies to Meet in Kansas City.

To the Editor of Electrical Review:

The next semi-annual convention of the Association of Edison Illuminating Companies will be held at Kansas City, Mo., on Tuesday, February 12th.

Accommodations have been arranged for members of the association at the Coates House, Kansas City. Yours truly,

J. H. Vail, *Secretary.*

New York, Jan. 25, 1889.

Cigar Lighting by Electricity.

The electric cigar lighter we illustrate in this issue is manufactured by the Westinghouse Electric Company, and is to be introduced to the smoking public this month. When the current is turned on a bunch of bare wire loops at the end of the handle, which are contained in incombustible material, are heated to a red heat and the cigar is lighted like you would light it from a red hot coal. Just how popular this will become remains to be seen. It certainly will be convenient.

—— The N. B. Schuyler Electric Light Company, of New Britain, Conn., elected as directors, P. Corbin, John Spring, R. J. Vance, C. O. Case, John Hanna, Thomas McCabe and S. Wilcox. The directors elected John Spring, president; Samuel Bassett, secretary, and R. J. Vance, treasurer.

——The Philadelphia and Reading R R. has contracted with Mr. Geo. W. Silsby, agent Edison United Electric Light Co., to light three ferry boats with the Edison light, forty 16 candle power lamps being used in each case. Mr. Silsby has also secured a contract for central station at South Amboy, New Jersey, consisting of 285 municipal lamps of 20 candle power each, also a central station at Nyack, New York, which is to be 15,000 sixteen candle power lamps.

—— The *Athol Transcript* gravely announces that "the Thomson-Houston Company is taking an interest in street railways." Considering the large number of street railways in successful operation on the T.-H. system, this looks as if the editor of the *Transcript* neglected to read his electrical exchanges. A second statement "that an electrical railroad between the two Athol villages will be a paying enterprise at no distant day," is more pertinent.

—— The Electrical Accumulator and Lighting Company have cut off all their lights in the city hall. When the new boilers were being put in last fall the officials burned gas to keep themselves warm, and the city has never whacked up with the gas company, which looks to the accumulator company for payment. The accumulator asked the council to settle the matter some months ago, and have now taken this method of hurrying the city dads up a little.—*Detroit News.*

—— The incorporators of the Windsor Locks Electric Light Company had a meeting and voted to have the charter extended for two years more, and petition the Legislature for the same. If the mill owners and manufacturers could be persuaded to use electric lights in their mills, the scheme could be made a paying one, and the power could be furnished by one of the mills that has a large surplus, and thus save erecting buildings, placing boilers, etc. If they are successful, active measures are promised.

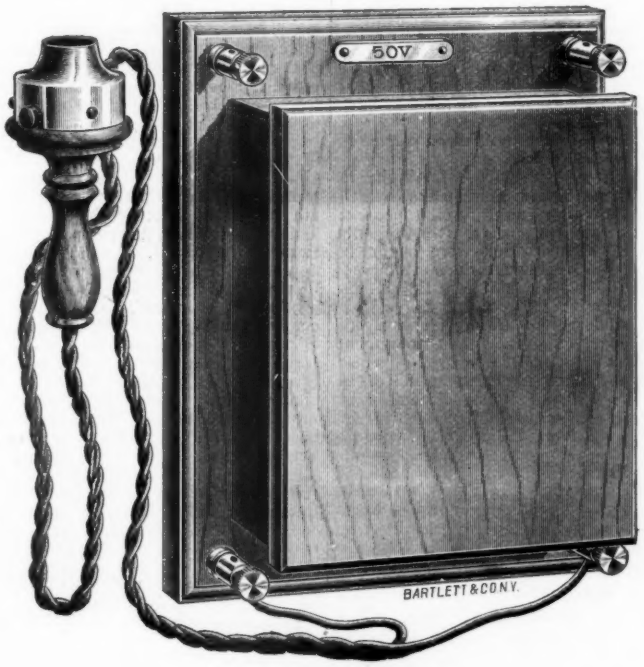
—— A number of New York gentlemen were recent visitors at Pittsburgh investigating the alternating system of the Westinghouse Company. In the party were Prof. Henry Morton, Hugh Bonnar, Chief of the N. Y. Fire Department; A. C. Hull, Chief of the Fire Patrol; J. Elliott Smith, superintendent of the Fire Alarm Telegraph; Charles L. Gunn, F. M. Griswold, George M. Coit, W. A. Anderson, A. M. Kirby, W. DeL. Boughton, A. C. Miln, Frank L. Pope, and George H. Lewars. The gentlemen were reported as highly pleased with the fine electrical work they saw.

—— The annual meeting of the stockholders of the Olean Electric Light and Power Company, of Olean, N. Y., was held last week, when the following board of directors was chosen: J. V. D. Coon, Wm. M. Irish, N. V. V. Franchot, James Kelsey, M. C. Follett, C. S. Stowell and F. W. Higgins.

—— Several months ago the trustees of the court house and jail, Rochester, N. Y., substituted gas for electricity as a means of lighting the court house. The new trustees have evidently changed back again, for workmen are engaged in replacing the burners preparatory to resuming the electric light.

—— Indiana is being pretty thoroughly lighted by electricity. At Chestertown, of that State, steps are being taken to put in a $7,500 plant, and at Peru, also in that State, an electric light has been placed at the top of the spire of one of the churches so that it is 175 feet from the ground and can be seen for a number of miles.

—— The annual meeting of the Manchester Electric Light Company was held recently. The treasurer's report showed an improvement over last year. Directors elected: James A. Weston, Frank Dowst, Alonzo Elliott, Harry E. Parker, Eugene S. Whitney, Wm. L. Elkins, Jr., Walter G. Africa, Albert Merrill, Joseph W. Hildreth.



Electric Cigar Lighter.

—— Contractor E. F. McIntire has begun the work of erecting the new electric station on Peabody street, Salem, Mass. The building will be 115x66 feet, with a boiler-house beside of 50x90 feet. The boilers will have an ultimate horse-power of 1,200. The engine house will accommodate five large engines, though but three will be put in at the outset. The electric light company at present has a capacity for 330 arc and 400 incandescent lights.

—— President S. P. Hamilton, of the Brush Electric Light Company, Savannah, Ga., has made a contract to place 188 incandescent lights in the Marshall House and one arc light in front. As soon as these lights are in gas will be an unknown illuminator in Savannah's four hotels, the Pulaski House having in use 250 incandescent and one arc light, the Screven House 268 incandescent and one arc light, and the Harnett House 68 incandescent lights.

—— The city of Bangor, Me., has been full of representatives of the electric companies to bid for the contract for putting in the plant. Among those there were Mr. A. G. McClure, of the Westinghouse; Mr. Haley, of the Brush; Mr. George D. Allen, of the Excelsior; Mr. J. George Hailher, of the Western Electric, and two others. All of them have put in bids. The members of the city council seem to be strongly in favor of putting in the plant.

—— The Pottstown (Pa.) Electric Light Company has elected the following officers: Managers, C. H. Bower, Herman Wells, J. A. Healy, L. Saylor, Calvin Fegley, W. S. Ellis, J. C. Sotter; treasurer and secretary, H. D. Saylor.

—— Laurens, S. C., is agitating the question of electric lights. Preston B. Hicks, general manager of Edison Light Company, is a native of Laurens, and through his generosity in contributing his commissions, the cost will be much reduced.

—— The New Bedford Gas Light Company has declared a quarterly dividend of two per cent. The company is to put in a new Westinghouse dynamo of 1,500 light capacity, making the total incandescent light supply of the station 4,000 lamps.

—— At a directors' meeting of the New Haven Electric Light Company Tuesday it was voted to increase the capital stock from $200,000 to $250,000 according to the privileges of the charter, which limits the increase to $500,000 at the option of the company.

—— At Annapolis, Md., Wm. B. Gardner & Bros., of Annapolis, have received the contract to erect the house for the plant of the Annapolis Electric Light Company. Work will be begun at once. The site adjoins the short Line Railroad property. The building will be of brick.

—— The Thomson-Houston Electric Company, St. Louis, will hold a meeting March 9th, to change the name of the company to the United Electric Light & Power Company, to increase the capital stock of the company to $500,000, and to increase the number of directors from five to seven.

—— One of the bills introduced in the Maine Legislature last week was by Senator Burgess provided for the incorporation of the Camden and Rockport Electric Light Company, with a capital stock of $12,000. Johnson Knight and Jane D. Knight are mentioned as incorporators.

—— An illustration in the Buffalo *Express*, giving a view of the wrecked suspension bridge at Niagara Falls, shows a number of men suspended from the bridge engaged in repairing the Brush electric light cable to Canada. It is not likely that any lineman begrudges them the job.

—— Springfield and Northampton have refused to pay the bills presented to them for lighting the streets by electricity, because, while the lighting companies contracted to furnish light of 2,000 candle power, expert tests show that the lights furnished are not that power. In Springfield, the average on all the circuit measured is said to have been only 831 candle-power, and in Northampton but little more.

Electric Light News

—— Over 1,000 buildings in Philadelphia are supplied with electric lights.

—— The Empire Plaid Mills, High Point, N. C., have put in electric lights.

—— Electric lights have been placed in the new B. & O. depot at Pittsburgh.

—— Fairhaven, Mass., is much interested in electric illumination, and talks of introducing a plant at once.

—— The streets of Hallowell, Me., will be lighted by electricity in a few days. The wiring is nearly completed.

—— The Waterville, Me., Electric Light and Power Co. is about to increase its capital stock from $50,000 to $75,000.

—— The Mount Holly Electric Light Company, of Mount Holly, N. J., will extend its lines to Lumberton, that State.

—— The City Electric Lighting Company of Topeka, Kas., is burning petroleum for its steam fuel instead of coal, as heretofore.

—— Electric lights will be put in the new Judson Female Institute to be built at Marion, Ala., and that replaces the one recently burned.

—— Lowell, Mass., has been holding citizens' meetings of those interested in forming a new company to introduce incandescent lighting.

—— A bill introduced into the Missouri Legislature is to the effect that criminals sentenced to death in 1889 shall be executed by electricity.

—— The United States Rolling Stock Company, at Anniston, Ala., will put in an electric plant for lighting their large car and locomotive works.

—— The Edison Electric Light and Power Company, just organized at Portsmouth, Va., will purchase machinery for their plant about February 1.

—— The Nashua (N. H.) Light, Heat and Power Company has declared a semi-annual dividend of $5 a share, equal to 8⅓ per cent., the par value of the shares being $60.

—— The Rhode Island and Narragansett Electric Companies have petitioned the city council for the exclusive right to lay underground conduits for electric light wires in the city of Providence.

—— Philadelphia is reported to have 10 miles of conduit laid in that city. The Penn Electric Light Company has been recommended to receive a two years' extension for the completion of the conduit system.

—— C. M. Seay, Rome, Ga., will erect an incandescent electric light plant, 25 arc light, to be known as the Crown Electric Light Company, and will light stores, residences, public and private institutions.

—— The Westinghouse Electric Company is reported to have secured a large electric lighting contract in St. Louis. It will be remembered that the several lighting companies in that city recently consolidated.

—— The incandescent electric lights, which have come into such general use in business places, in Berlin, N. H., are proving a big success. They were put in by the Sawyer-Man Company, by their agent, James H. Cary.

—— At a meeting of the stockholders of the Wissahickon (Pa.) Electric Light Company, the following named officers were elected to serve the ensuing year. President, William Johnson; vice-president, Leander M. Jones; secretary and treasurer, Charles K. Smith; manager, James Christie; directors, William Johnson, Charles K. Smith, James Christie, Leander M. Jones, Isaac Wilde, Peter Libert, H. R. Shultz.

THE SUPREME COURT DECISION.

INTERVIEWS WITH ATTORNEYS AND OFFICIALS OF ELECTRIC LIGHT COMPANIES—A FAR-REACHING DECISION.

The decision of the Supreme Court in the case of the Bate Refrigerator Company, announced in the REVIEW last week, has been discussed quite generally in electrical circles since. The REVIEW, realizing its importance, presents a number of interviews with gentlemen informed on the matter, the first being with Mr. E. H. Johnson, the president of the Edison Electric Light Company.

"The decision of the Bate Refrigerator case by the Supreme Court," said Mr Johnson, "is the decision of a point which has, up to date, proved an impassable barrier to the progress of our efforts to establish in the courts our exclusive right to the incandescent lamp. As the Bate case was already upon the Supreme Court calendar, we some time ago effected an arrangement with the Bate Company whereby we were to lend them the assistance of our counsel in properly presenting the points involved in the case before the Supreme Court. But, on account of the large number of cases on the docket of the Supreme Court, the Bate case itself would not have been reached for upward of two or three years. To overcome this delay, the Edison Company sought and obtained a substitution of the Bate case for another one near the head of the docket, and about to be heard. The case was argued for the appellants on January 2, 3 and 4 by William M. Evarts and Clarence Seward. We were also represented by Judge John Lowell, of Boston, ex-Judge Noah Davis and Richard N. Dyer, counsel for the Edison Company. The case was argued for the appellees by Chauncey Smith, of Boston, B. F. Thurston, of Providence, and G. H. Lothrop, of Detroit. They were also represented by the counsel of the various electric light companies. The point decided is one which is far-reaching in its effect upon patent-protected industries in general, and does not exclusively apply to the cases named. It is one which will, furthermore, very materially affect the administration of the Patent Office itself. We have sent the following circular to the licensees and agents of the Edison Electric Light Company:

"It gives us pleasure to inform you that the decision of the Supreme Court of the United States filed yesterday in the case of the Bate Refrigerating Company is in fact a decision in our favour and obtained by us upon the question of the validity of all our fundamental patents under which your licenses have been granted. We have now only to prove the fact of infringement in order to secure prompt injunctions against and damages from those who have so long been using with impunity that which the highest authority now concedes to have been our exclusive property from the beginning.

"No serious effort will be made by any one to deny an infringement which, by reason of the immunity felt, has become so manifest and pronounced as to render effective defence now impracticable and absured. This most gratifying result has been reached only by the expenditure of a great amount of energy and money, which is the best refutation of the charges of apathy and want of confidence on our part so often made by the infringers of our patents.

"We held a meeting this afternoon," continued President Johnson, "of the Patent Litigation Committee, of which ex-Judge Noah Davis is chairman, and had a general conference as to the steps which we shall take immediately to press the many suits for infringement of the patents involved by this decision, brought some time since in the Circuit courts, against the Westinghouse, Sawyer-Man, Thomson-Houston and United States Electric Lighting Companies. The Supreme Court having settled definitely the disputed point as to these patents being dead or alive we have now only to prove infringement and try the patents on their merits. And in respect to the question of merit, which is simply as to whether the Patent Office was justfied in granting the patents to Edison, we have the decision of the courts of Germany and England five times in his favor, as against one adverse decision, which latter will doubtless be reversed by the Court of Appeals to which it has been taken. The imperative conclusion from these decisions is, that since the literature of the art as searched by the experts of Europe, fails to disclose any anticipation of Edison's inventions, it will disclose none to the search of the experts of the United States. Therefore, the decision of the Supreme Court is to all intents and purposes a decision that to him belongs the exclusive right to an enjoyment of the industry of incandescent electric lighting."

Mr. R. N. Dyer, the attorney of the Edison Electric Light Company, was asked by the REVIEW for his views in relation to the decision and its application and influence. Mr. Dyer said:

"The decision of the Supreme Court in the case of the Bate Refrigerating Company *vs.* Hammond, rendered January 21st, upsets in favor of patentees a construction of the statute which has been uniformly upheld by the Circuit Court since 1878. That construction is that in case the patentee secures his foreign patent before his domestic patent, the domestic patent will expire at the end of the technical term for which the foreign patent is granted, notwithstanding the fact that the foreign patent can be extended as a matter of right and not of favor up to a full duration of fifteen years. Thus Canadian patents were granted for five years with the privilege of extensions that would continue the patents in force for fifteen years. Our Circuit Courts decided that the later United States patents expired at the end of the first five years, thus producing the absurdity of having a United States patent killed by a foreign patent which continues to exist, although the object of the law is supposed to be to terminate the monopoly simultaneously in both countries. The Supreme Court has returned to the reason of the thing and decided that so long as the foreign patent is continued in force the domestic patent will live, but not beyond the extreme limit of seventeen years. The prior foreign patent in the Bate case is a Canadian patent. The decision, however, ignores the act which the Canadian Parliament passed in 1883, declaring all Canadian patents to be fifteen year patents, and hence the decision is not alone applicable to the case of Canadian patents, but also to other short term extensible patents, such as those of Austria and Italy."

"Do you find that the decision covers all the points at issue?"

"The Supreme Court was also asked to decide that the foreign patent in order to limit the domestic patent must be one granted before the filing of the application for the domestic patent. The decision of this proposition not being necessary for the disposition of the case, the court left it an open question. I have no doubt that when obliged by the circumstances of the case to decide this question, the Supreme Court will limit the operation of the law to foreign patents granted before the domestic applications. Such a decision, however, would only make a difference of about two years in the life of the domestic patents, provided the foreign patents are kept alive as have been the Edison patents."

"How does it affect the Edison patents?" inquired the REVIEWITE.

"The decison has the effect of bringing to life the Edison electric light patents which are limited by short term foreign patents, making it possible to proceed with the suits upon such patents which were begun in 1885. Among these patents the most important are the lamp patents of Mr. Edison, including the patent on the filament of carbon inclosed in a vacuum chamber entirely of glass. The patent covering the employment of feeders in a system of distribution is also one of these favorably affected by the decision. We have already obtained from Judge Wallace an order on the defendants to show cause on next Friday, February 1st, why we should not be permitted to go ahead in our suits here in accordance with the decision of the Supreme Court. Now that we are in position to press our suits, we propose to do so with the maximum rapidity permitted by legal procedure."

The REVIEW interviewed Captain H. R. Garden, general counsel of the Consolidated Electric Light Co., and the Sawyer-Man Electric Co., and asked his opinion of the decision. The Captain replied that he had several years ago gone into this question and studied the decisions of the Supreme Court, and secured the opinion of a judicial friend of his, and the conclusion reached by him in 1884 was that the Supreme Court would decide just as it had decided, and the decision he believed was correct and equitable. The cases would now go back to the lower courts to be tried on their merits instead of on a technicality. The Captain also said that it meant big fighting, and the lawyers connected with the cases on both sides would be kept busy, and as he was a lawyer, he did not think he and the other attorneys should complain. What he had always contended for was the invention of the incandescent lamp by Messers. Sawyer and Man, and on that point he had perfect confidence of success.

Mr. E. N. Dickerson, the widely known patent-attorney, was interviewed as follows:

"The point that was decided is only important as applied to a number of existing cases in which by ignorance, foreign patents were permitted to expire, or were taken for five years when they might have been taken for fifteen. No one will be likely to repeat that blunder, and so the decision on that point is not generally important. The case at issue was this—and Edison has many others like it—Bate took a patent in Canada for five years, which, according to their law, might be extended for fifteen as a matter of right simply by paying the fees. That five-year patent expired, and when his American patent for the same thing came to trial it was held that it had been terminated by the expiring of the Canada patent. In that situation a statute was passed in Canada constructing their law to mean that the five-year patents were really fifteen-year patents when granted, subject, however, to being terminated in five years, at the will of the patentee, by not paying a fee. If that is true then the American patent would not be affected by the default in Canada, because that patent is a fifteen-year patent, and our statute refers to the actual original term of the foreign patent as a limit, and not to any possible forfeiture of that term. I do not know, from the report, whether the Supreme Court has put its decision on that statute, or upon the broad ground that the Canadian patent is, in law, a fifteen-year patent, irrespective of that statute. If upon this latter ground, then it is applicable to all European patents in similar situation, as a general principle; if upon the statute of Canada, of course it only affects such American patents as have been patented in Canada for five years."

Mr. John C. Tomlinson, who has been identified with the Edison suits, was asked his opinion of the decision, and said:

"The facts in the case of Bate Refrigerating Company recently decided by the Supreme Court of the United States were briefly these: Bate had applied for the patent in the United States before applying in Canada. A patent, however, was issued on his application in Canada for five years, before his United States patent was issued. Before the expiration of the five years' term of the Canadian patent, it was properly extended to 15 years under the Canadian law. In the Supreme Court it was contended on behalf of the complainant that under Section 4887 of the Revised Statutes of the United States, a patent applied for in the United States before any application was filed abroad, was in no way affected by any foreign patent issued prior to the United States patent. It was also contended that if the foreign monopoly had not in fact expired, the United States patent continued in force, and this irrespective of the formal term for which, under the foreign law, the foreign patent was granted. The decision of the Circuit Courts had been that the United States patent was limited by the term of the foreign patent, and that it was not important whether the foreign patent had expired within its original term or been extended beyond it. And further, that the application in this country prior to the application abroad was immaterial. The decision of the Supreme Court referred to is confined to one point, viz: that if the foreign monopoly is under the foreign law in force, the United States patent does not expire, thus making the expiration of the foreign monopoly under the foreign law, and not the formal term of the foreign grant, the test of expiration. This is a complete reversal of the doctrine of the Circuit Courts. The Supreme Court declines to pass upon the question of the application and the other questions raised. A number of patents have been taken out by American inventors which come within one of the four following classes:

"First.—Cases in which the American application was filed before the foreign application and where the foreign patent has been kept in force.

"Second.—Where the American application was filed before the foreign application and the foreign patent has been allowed to expire.

"Third.—Where the foreign application was filed after the American application and the foreign patent has been kept in force, and,

"Fourth.—Where the foreign application was filed after the American application and the foreign patent has been allowed to expire.

"Patents which come under the 2d, 3d and 4th classes mentioned, are in no way affected by the decision of the Supreme Court."

Mr. L. E. Curtis, secretary and attorney of the United States Electric Lighting Company, was asked to give his views. He said:

"I do not think that the Edison company has great cause for jubilation. At the most the decison on the case affects only partially certain preliminary questions raised in the Edison suits and does not in any way relate to the merits of the cases. In some of these suits, the defendants claimed, as a preliminary defence, that the patents had expired before the suit was brought, by reason of the expiration of prior foreign patents of the same invention. Under the ruling of the Bate case, as I understand it, Mr. Edison's patents are still limited by the foreign patents, but not to such short terms. There are still various questions relating to foreign patents to be disposed of in these cases. We are fully prepared to proceed with these defences at any time, and our counsel, who have examined the matter carefully, have advised us that these defences are perfectly good and must prevail. In one of the Edison suits on the patent for dynamo machines, one of the broadest and most important of the Edison patents, we put in our proofs on the merits some two or three years ago, and showed conclusively that the invention was in use long before Mr. Edison claimed to have made it. The suit was dropped and we have not been able to persuade them to go on with it since.

"We raised the foreign patent question as a preliminary defence merely to avoid the trouble and expense of a long trial on the merits, and the decision in the Bate case, so far as it applied to any of the Edison suits, simply enables the Edison Company to try the suits in the ordinary way. We do not feel at all alarmed at the outlook, and have full confidence in our ability to protect our rights in the courts or any place else where we may be attacked. It does not interfere with our work in the least, and the pretensions that the decision gives Mr. Edison any monopoly of incandescent lighting are very absurd. The Bate decision will be a great help to us in one way, since it removes limitations from our patents. We anticipate no injury from it, beyond increasing the expenses of the litigation."

Effect of a Foreign Patent on a Subsequent U. S. Patent.

TO THE EDITOR OF ELECTRICAL REVIEW:

The decision of the Supreme Court, rendered on the 21st inst., in the Bate Refrigerating Company *vs.* Hammond *et al.*, settled some important questions as to the effect of a foreign patent upon the term of a subsequently granted U. S. patent.

Prior to the grant of the U. S. patent in suit, but subsequently to the application therefor, a similar Canadian patent was granted for five years and extended by two subsequent grants for 15 years.

The Circuit Court held the U. S. patent to have expired five years after the grant of the Canadian patent, notwithstanding the extensions.

The patentees contended in the Supreme Court:

"(1) That the words: 'First patented or caused to be patented in a foreign country' (R. S., 4887) do not mean 'first patented or caused to be patented' before the issuing, or granting, or date of the U. S. patent, but mean 'first patented or caused to be patented' before the date of the application for the U. S. patent; (2) that the declaration of the section that 'every patent granted for an invention which has been previously patented in a foreign country shall be so limited as to expire at the same time with the foreign patent, or, if there be more than one, at the same time with the one having the shortest term,' does not mean that the patent so granted shall expire at the same time with the term to which the foreign patent was in fact limited at the time the U. S. patent was granted; but that it means that it shall expire when the foreign patent expires, without reference to the limitation of the term of such foreign patent in actual force at the time the U. S. patent was granted."

The Court says: "We do not find it necessary to consider the first of these questions, because we are of opinion that the proper construction of section 4887, upon the second question, is, that the patent in the present case does not expire before January 9, 1892, the time when the Canadian patent, No. 6,938, will expire. * * *

"The Canadian patent, therefore, has never ceased to exist, but has been in force continuously from January 9, 1877. It was in force when No. 197,314 was issued; and it was, by virtue of a Canadian statute, in force when the application for No. 197,314 was filed, continued to be in force at all times since the latter patent was granted. * * * *

"Therefore the Canadian patent does not expire, and it never could have been properly said that it would expire before January 9, 1892; and hence, No. 197,314, if so limited as to expire at the same time with the Canadian patent, cannot expire before January 9, 1892. * * * *

"But we are of opinion that, in the present case, where the Canadian statute under which the extensions of the Canadian patent were granted, was in force when the United States patent was issued, and also when that patent was applied for, and where, by the Canadian statute, the extension of the patent for Canada was a matter entirely of right, at the option of the patentee, on his payment of a required fee, and where

the fifteen years' term of the Canadian patent has been continuous and without interruption, the United States patent does not expire before the end of the fifteen years' duration of the Canadian patent." * * *

The court further says: "While it may be proper, in a case where the date of a foreign patent issued prior to the granting of a United States patent to the same patentee for the same invention, is made known to the patent office prior to the granting of the United States patent, to insert in that patent a statement of the limitation of its duration, in accordance with the duration of the foreign patent, it does not affect the validity of the United States patent if such limitation is not contained on its face."

The two points thus decided in this case are: 1st. That where a foreign patent is granted for a short term with the option of extension by the patentee as a matter of right, and the term remains continuous, a subsequent United States patent will expire with the expiration of the last of the extended times of the foreign patent, provided it does not exceed 17 years. 2d. That a United States patent is neither void nor voidable because of the failure to limit its term on its face by reference to the grant of a prior foreign patent, but that the true date of the extension of the patent is a matter of evidence.

The bearing of this decision on numerous valuable and important electrical patents is obvious, but we leave the discussion of that branch of the case to others.

BALDWIN, DAVIDSON & WIGHT.

The Fisher System of Electric Railway at Sault Ste. Marie, Mich.

The Fisher-Rae system of electric railways, of the Detroit Electrical Works, is coming rapidly to the front as a complete and successful method of electric traction, the several roads equipped by this company being in every way satisfactory. The accompanying illustration is from a photograph of an installation upon the Fisher system at Sault St. Marie, Mich. This road commenced operation in May last, and has met no difficulties from the rigorous climate of that section, nor failed at any time for any cause to operate with entire satisfaction. The double overhead conductor plan adopted shows its value in this equipment, where cars are at times required to force their way through heavy snow and ice covered tracks.

Three cars are operated at present, and two more will be operated in a short time. The road is four miles in length, has several grades up to four per cent., with several grades on curves, being all the conditions usually met on street railways.

The Detroit Electrical Works are adding many new and valuable improvements to their system, and are engaged in equipping several important roads.

Another Company Added to the Westinghouse Combination.

The Westinghouse electric interests have been increased once more, by what is announced as an agreement between the Westinghouse Electric Company and the United States Electric Lighting Company, and, although it is said that these two companies have merely made an arrangement of mutual protection of prices and litigation of patents, it is also well understood that the Westinghouse Electric Company will have a controlling voice in the management of the United States Electric Lighting Company's business.

The Westinghouse Electric Company has now really the control of the Consolidated Electric Light Company, the Sawyer-Man Electric Company, the Waterhouse Electric and Manufacturing Company, and the Tesla Electric Lighting Company, and the control of these with the now announced combination with the United States Electric Lighting Company makes it one of the strongest electric lighting organizations in the world. A vigorous business policy is looked for, and with a backing of a capital of over $10,000,000, represented by these different interests, a large business can certainly be looked for.

A large number of central stations and isolated plants have been put out by these different companies, yielding an immense income on lamp renewals alone. The combined factories will have a capacity of 16,000 lamps per day. Arrangements are being made for even increasing this large output.

The United States Company has brought into the combination some very valuable patents, which will add greatly to the strong legal position of the Westinghouse interests.

PERSONAL.

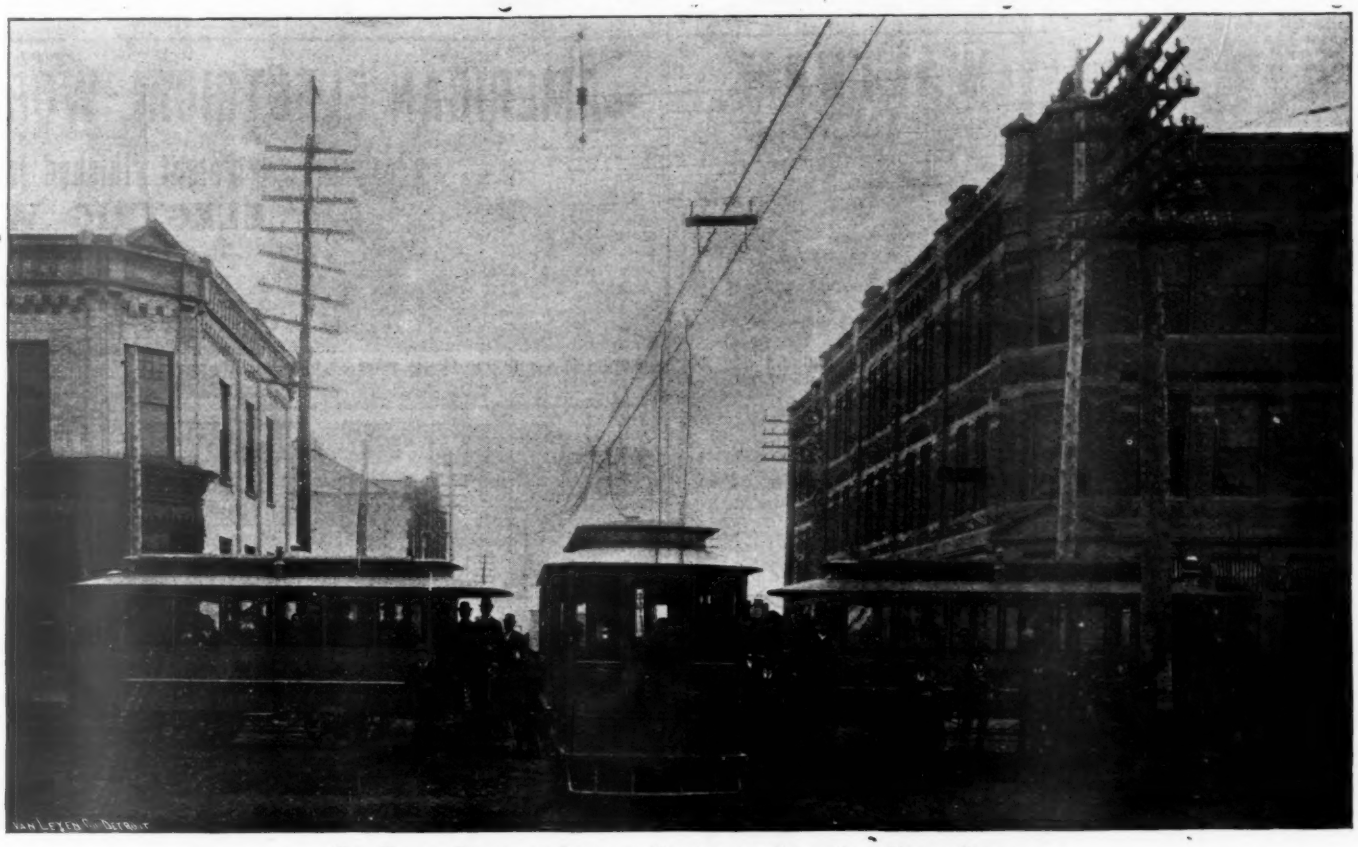
Mayor Grant, of this city, has been elected president of the Board of Electrical Control.

Mr. Chas. Dutton has arrived in Charlesleston, S. C., and will deliver a course of lectures in the South before his return to telephone duties in New York City.

Mr. W. H. McKinlock, of Chicago, accompanied by his wife, is visiting New York where he has scores of friends. The Central Electric Company, of which he is the head and front, has become one of the prominent and successful electrical supply houses of the great West, and is now reaching out for fresh fields to conquer.

Gen. O. E. Madden, president of the Empire City Electric Company, although owning a fine residence in Boston, is becoming more and more attached to New York, and his friends confidently predict that the metropolis will soon number him permanently among her prominent citizens.

Mr. David Ward, of Detroit, Mich., is visiting New York, a guest of his son, Mr. Chas. W. Ward, general manager of the Geneva Non-magnetic Watch Company. Mr. Ward, though well advanced in years, is a hale and cheery gentleman, and the work of managing his $20,000,000 has apparently been an easy burden.



THE FISHER SYSTEM OF ELECTRIC RAILWAY AT SAULT STE. MARIE, MICH.

The Company Owns its Wires and Fixtures.

A verdict was rendered in favor of the plaintiff in the case of the Harrisburg (Pa.) Electric Light Company against B. & E. Goodman. The latter ceased using the light furnished by the plaintiff's corporation, but refused to permit the removal of the electric fixtures, but retained them for use by a rival electric company, whose light was introduced. The value of the property was small, nominally $10, but the principle involved was whether the rival company could appropriate to their use the wire of a competing company without compensation by the tenant of lessee claiming the wires. The verdict of the court was a complete vindication of the rights of the Harrisburg company, awarding not only the entire property, but a judgment for $50, the excess $40 as damages. The principle determined by this case that a company which lets or hires its electric wires, fixtures and appliances to another for use, and reserves the right to remove the same, preserves its ownership of them as personal property, notwithstanding the wires may be covered up in the ceiling and fastened to the floors and walls of the building, as in this case.

Electric Smelting Patents.

The taking of testimony by the Cowles Electric Smelting Company at Lockport, N. Y., continues. An application for United States patents was thrown into interference with the principal patents of Messrs. Cowles by the patent office some time in 1886, the applicant being Mr. Camille A. Faure.

The result of this litigation is said to involve the ground claims to the process of electric smelting, and is being hotly contested. Messrs. Baldwin, Davidson and Wight are counsel for Mr. Faure, and Messrs. Leggett, of Cleveland, attorneys for the Cowles Smelting Company, General Leggett himself having attended taking of the depositions to the present time.

The Conduit System in Omaha, Neb.

The newly organized Omaha (Neb.) subway company has elected the following officers: George E. Barker, president; Ernest Riall, vice-president; Frank P. Johnson, treasurer, and Dr. John J. Saville, secretary. The company will apply to the city council for a charter and franchise. They are all Omaha men and have adopted the Dorsett system licensed by the National subway company of Chicago.

—— A company has been organized with T. L. James, president, and W. H. H. Wooster, secretary, to discuss the project of providing Seymour, Ct., with electric lights. One plan was to arrange with the Shelton Electric Light Company to run wires to Seymour if a sufficient number of subscribers could be secured, and furnish lights at the same price as in Birmingham and Ansonia. The other plan proposed was to organize a company and establish a plant. It is estimated that the cost of two 500-light dynamos and other machinery necessary to start would be $18,000. A committee was appointed, consisting of James Swan, Edmund Day, W. H. H. Wooster, H. N. Eggleston and C. H. Lounsbury, to look into the matter.

Mr. A. D. Newton, the energetic manager of the Eddy Electric Manufacturing Company of Windsor, Conn., spent a few days last week at his New York headquarters, 115 Broadway. Mr. Newton is greatly pleased with the business his company is securing in electric motor work.

Mr. W. D. Sargent will have charge of the American Bell telephone exhibit at the Paris exposition. A better man to represent the telephone interests of this country could not have been secured, and the many friends of Mr. Sargent will be greatly pleased to learn that his health has so improved that he is able to assume the responsibilities of this work.

It is difficult, as every editor knows, to always have unfamiliar names appear in print correctly spelled. The efforts of a reporter of a city daily in announcing the attendants at the Dickerson lecture before the Electric Club is entitled to special recognition as carrying off high honors in respect to errors of this nature. The note appeared as follows: "Among the interested listeners were Capt. Henry Erbese, U. S. N., (Erben); W. O. Knedle (W. A. Kreidler), of Chicago; Geo. F. Foster (Porter), of Philadelphia; J. H. Woodboy (C. J. H. Woodbury), of Boston; and H. D. Slandly (Stanley), of Bridgeport."

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING JANUARY 16, 1888.

396,334 Overhead insulator; Samuel H. Gilson, Salt Lake City, Utah.
396,342 Galvanic battery; Bernhard Scheithauer, Halle-on-the-Salle, Germany.
396,355 Dynamo electric machinery; Isaac T. Dyer, Chicago, Ill., assignor of five-eighths to Peter Fish and Gustav Mourath, same place, and George C. Ewing, Jr., Enfield, Mass.
396,365 Electric railway signal; William C. Paul and Oscar D. Kleinsteuber, Milwaukee, Wis., assignors of one-third to Thomas K. Ewing same place.
396,367 to 396,369 Secondary battery; Isaiah L. Roberts, Brooklyn, assignor to the Roberts-Brevoort Electric Company (Limited), New York.
396,403 Electric meter; Marie J. R. Jacquemier, Paris, France.
396,407 Electric wire conduit; John Lynch, Washington, D. C.
396,422 Regulator of alternate current generators; Gustav Pfannkuche, Cleveland, Ohio, assignor to the Brush Electric Company, same place.
396,439 Electric switch; Elmer A. Sperry, Chicago, Ill.
396,450 Municipal telegraph system; Theodore J. Zoeller, Louisville, Ky.
396,465 Sounder attachment; George H. Carey and Wm. McArthur, Danville, Mich.
396,543 Underground system of electric wires; Henry B. Cobb, Wilmington, Del.
396,549 System of electrical distribution; Edward N. Dickerson, Jr., New York, N. Y.
396,557 Dynamo for telegraphic purposes; Berthold Gmur, Schanis, and Otto Flatz, Niederurnen, Switzerland, assignors of one-half to Bronislav Deisenberg, Travnik and Joseph Gmur, Schanis, Switzerland.
396,579 Wiring block for electrical circuits; Osborn P. Loomis, Somerville, Mass., assignor to the Loomis Electric Manufacturing Company, of New York.
396,580 Coupling dynamos; Osborn P. Loomis, Somerville, Mass., assignor to the Loomis Electric Manufacturing Company, of New York.
396,581 Coupling of dynamos and motors; Osborn P. Loomis, Somerville, Mass., assignor to the Loomis Electric Manufacturing Company, of New York.
396,582 Automatic ground detector for electric circuits; Osborn P. Loomis, Somerville, Mass., assignor to the Loomis Electric Manufacturing Company, of New York.
396,583 Incandescent lamp socket; Osborn P. Loomis, Somerville, Mass., assignor to the Loomis Electric Manufacturing Company, of New York.
396,602 Combination of electric generators; Edwin W. Rice, Jr., Lynn, Mass.
396,603 System of electrical distribution; E. Wilbur Rice, Jr. and Albert L. Rohrer, Lynn, Mass.
396,618 Electric railway trolley support; Sidney H. Short, Columbus, Ohio.
396,632 Time switch; Benjamin E. Waters, Brockton, assignor one-half to Moses E. Hatch, New Bedford, Mass.

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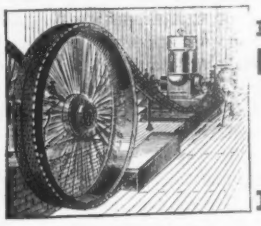

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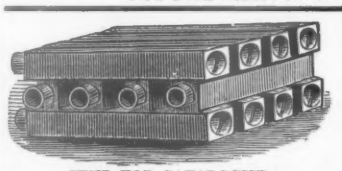

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